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A Member of the International Code Family[®]

ICCPC

ICCPC

2012 ICC Performance Code® for Buildings and Facilities

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Introduction

Internationally, the design and regulatory community has embraced the need for a code that emphasizes performance requirements rather than prescriptive requirements. This need is not unique to the international community. As such, the *ICC Performance Code® for Buildings and Facilities* (ICCPC®), in this 2012 edition, is designed to meet this need through model code regulations that safeguard the public health and safety in all communities, large and small. The *ICC Performance Code® for Buildings and Facilities* clearly defines the objectives for achieving the intended levels of occupant safety, property protection and community welfare. The code provides a framework to achieve the defined objectives in terms of tolerable levels of damage and magnitudes of design events, such as fire and natural hazards. The concepts covered by this code are not intended to be any different in scope than those covered by the 2012 edition of the *International Codes®* (I-Codes®) published by the International Code Council (ICC)®. However, this code is distinctly different from the other *International Codes*, which, in many cases, direct the user to a single solution to address a safety concern for a building or facility. The ICCPC allows the user to achieve various solutions, systematically. It should be noted that the family of *International Codes*, including the *International Building Code®*, *International Energy Conservation Code®*, *International Existing Building Code®*, *International Fire Code®*, *International Fuel Gas Code®*, *International Green Construction Code™* (to be available March 2012), *International Mechanical Code®*, *International Plumbing Code®*, *International Private Sewage Disposal Code®*, *International Property Maintenance Code®*, *International Residential Code®*, *International Swimming Pool and Spa Code™* (to be available March 2012), *International Wildland-Urban Interface Code®* and *International Zoning Code®*, is considered to provide an acceptable solution that will comply with the ICCPC. Conversely, this code provides a procedure to address design and review issues associated with the alternative materials and methods sections of the codes cited above. It is strongly recommended that users of this code consult the user's guide located in the second portion of this publication to gain additional insight into the provisions of this code. The *ICC Performance Code for Buildings and Facilities* provisions provide many benefits, including the model code development process, which offers an international forum for design professionals, code officials and other interested parties to discuss performance code requirements. This forum provides an excellent arena to debate proposed revisions. This model code also encourages international consistency in the application of provisions.

Development

The first edition of the *ICC Performance Code for Buildings and Facilities* (2001) was the culmination of an effort initiated in 1996 by the ICC. This effort included two drafting committees, Fire and Building, appointed by the ICC and consisting of representatives of the three statutory members of the International Code Council at that time, including: Building Officials and Code Administrators International, Inc. (BOCA), International Conference of Building Officials (ICBO), and Southern Building Code Congress International (SBCCI). The intent was to draft a comprehensive set of performance regulations, consistent in scope with the existing model codes, but with a performance emphasis. A new edition of the code is promulgated every three years. This code is founded on principles intended to establish provisions consistent with the scope of a performance code that adequately protect public health, safety and welfare; provisions that do not unnecessarily increase construction costs; provisions that do not restrict the use of new materials, products or methods of construction; and provisions that do not give preferential treatment to particular types or classes of materials, products or methods of construction.

Adoption

The *ICC Performance Code for Buildings and Facilities* is available for adoption and use by jurisdictions internationally. Its use within a governmental jurisdiction is intended to be accomplished through adoption by reference in accordance with proceedings establishing the jurisdiction's laws. At the time of adoption, jurisdictions should insert the appropriate information in provisions requiring specific local information, such as the name of the adopting jurisdiction. These locations are shown in bracketed words in small capital letters in the code and in the sample ordinance. The sample adoption ordinance on page xiii addresses several key elements of a code adoption ordinance, including the information required for insertion into the code text. In addition, because of the reliance of most performance-based design on proper maintenance of building and fire protection systems, it is recommended that a jurisdiction adopt this code in its entirety.

Maintenance

The *ICC Performance Code for Buildings and Facilities* is kept up to date through the review of proposed changes submitted by code enforcing officials, industry representatives, design professionals and other interested parties. Proposed changes are carefully considered through an open code development process in which all interested and

affected parties may participate. The contents of this work are subject to change both through the code development cycles and the governmental body that enacts the code into law. For more information regarding the code development process, contact the Codes and Standards Development Department of the International Code Council. While the development procedure of the ICC *Performance Code for Buildings and Facilities* assures the highest degree of care, ICC, its members and those participating in the development of this code do not accept any liability resulting from compliance or noncompliance with the provisions, because the ICC does not have the power or authority to police or enforce compliance with the contents of this code. Only the governmental body that enacts the code into law has such authority.

Code Development Committee Responsibilities

In each code development cycle, proposal changes to this code are considered by the ICC Performance Code Development Committee. Note that, for the development of the 2015 edition of the I-Codes, there will be two groups of code development committees and they will meet in separate years. The groupings are as follows:

Group A Codes (Heard in 2012, Code Change Proposals Deadline: January 3, 2012)	Group B Codes (Heard in 2013, Code Change Proposals Deadline: January 3, 2013)
International Building Code	Administrative Provisions (Chapter 1 all codes except IRC and ICC PC, administrative updates to currently referenced standards, and designated definitions)
International Fuel Gas Code	International Energy Conservation Code
International Mechanical Code	International Existing Building Code
International Plumbing Code	International Fire Code
International Private Sewage Disposal Code	International Green Construction Code
	ICC Performance Code
	International Property Maintenance Code
	International Residential Code
	International Swimming Pool and Spa Code
	International Wildland-Urban Interface Code
	International Zoning Code

It is very important that anyone submitting code change proposals understand which code development committee is responsible for the section of the code that is the subject of the code change proposal. For further information on the code development committee responsibilities, please visit the ICC web site at www.iccsafe.org/scoping.

Marginal Markings

The 2012 edition does not include any margin markings as the text has remained unchanged from the 2009 edition.

Italicized Terms

Selected terms set forth in Chapter 2, Definitions, are italicized where they appear in code text. Such terms are not italicized where the definition set forth in Chapter 2 does not impart the intended meaning in the use of the term. The terms selected have definitions which the user should read carefully to facilitate better understanding of the code. The purpose of the ICC *Performance Code® for Buildings and Facilities* (ICCPC) is to promote innovative, flexible and responsive solutions that optimize the expenditure and consumption of resources while preserving social and economic value. This approach is unique to the structure of a performance-based code.

The methodology employed in performance-based codes focuses on outcomes. In other words, a performance code

approach would identify and quantify the level of damage that is acceptable during and after a fire, earthquake or other event. Generally but not in all cases, the current prescriptive code focuses on solutions that achieve a certain outcome. The difficulty is that the outcome is unclear. Therefore, when a design is proposed that is different from the prescriptive code, it is often difficult to determine whether the approach will be equivalent. There may be other more appropriate and innovative solutions available. For example, sustainability is becoming a topic of interest both nationally and internationally. This movement has driven the increased desire for the use of environmentally friendly construction techniques such as straw-bale construction, rammed earth and the increased use of recycled materials. A performance-based code creates a framework that both clearly defines the intent of the code and provides a process to understand quantitatively what the code is trying to achieve. Without this framework, the above techniques would be fairly difficult to accomplish and new methods of construction take longer to implement.

The code is organized into four major parts:

Part I—Administrative (Chapters 1-4)

Part II—Building Provisions (Chapters 5-15)

Part III—Fire Provisions (Chapters 16-22)

Part IV—Appendices (A-E)

Part I—Administrative. Part I of the document contains four chapters in which common approaches were found for both building and fire. Chapter 1 contains administrative provisions such as intent, scope and requirements related to qualifications, documentation, review, maintenance and change of use or occupancy. Also, provisions for approving acceptable methods are provided. Chapter 2 provides definitions specific to this document. Chapter 3, Design Performance Levels, sets the framework for determining the appropriate performance desired from a building or facility based on a particular event such as an earthquake or a fire. Specifically, the user of the code can more easily determine the expected performance level of a building during an earthquake. In the prescriptive codes, the required performance is simply prescribed with no method provided to determine or quantify the level of the building's or facility's performance. Chapter 4 deals with the topics of reliability and durability and how these issues interact with the overall performance of a building or facility over its life. This issue has always been relevant to codes and standards but becomes more obvious when a performance code requires a designer to regard buildings as a system. Reliability includes redundancy, maintenance, durability, quality of installation, integrity of the design and, generally, the qualifications of those involved within this process.

Parts II and III—Building and Fire. Parts II and III provide topic-specific qualitative statements of intent that relate to current prescriptive code requirements. As noted, Parts II and III are building and fire components, respectively. The building and fire components were not fully integrated because of concerns relating to how such a document might be used. For instance, a fire department might want to utilize the document for existing buildings or facilities but would not be able to adopt chapters dealing with issues such as structural stability or moisture. Therefore, the code is designed so that a fire department could adopt Parts I and III only. When Part II is adopted, the entire document should be adopted. Part III should always be included in the adoption of this code. Generally, the topic-specific qualitative statements are the basic elements missing from the prescriptive codes. The statements follow a particular hierarchy, described below.

Objective. The objectives define what is expected in terms of societal goals or what society "demands" from buildings and facilities. Objectives are topic-specific and deal with particular aspects of performance required in a building, such as safeguarding people during escape and rescue.

Functional Statement. The functional statement explains, in general terms, the function that a building must provide to meet the objective or what "supply" must be provided to meet the "demand." For example, a building must be constructed to allow people adequate time to reach a place of safety without exposure to untenable conditions.

Performance Requirement. Performance requirements are detailed statements that break down the functional statements into measurable terms. This is where the link is made to the acceptable methods.

Part IV—Appendices. Part IV contains the appendices to the code document. Each of the appendices relates to specific provisions of this code and is discussed within the user's guide as applicable.

1. Preparation of a concept report in accordance with Section 103.3.4.2.1 by a qualified design professional.
2. Design preparation by a design team headed by a qualified principal design professional.
3. Coordination and verification via the principal design professional as a design team leader, with other design

professionals, owners and contractors, when applicable.

4. Submit plans and supporting documents to the code official that shall identify which portions of the design are performance based and which portions are based on the prescriptive code. The submittal must include deed restrictions proposed to cover future maintenance requirements and special conditions for the life of the building.
5. Plan review is to be conducted by the code official staff when qualified for performance-based design.
 - 5.1. When staff is deemed not qualified for a proposed project, acquire qualified contract review services.
 - 5.2. Peer review is an optional approach for obtaining an additional review that is supplemental to the plan review.
6. The code official verifies that applicable prescriptive code provisions and performance-based objectives are met. When special inspections are required, ensure that documentation is complete.
7. The code official approves plans and issues a permit.
8. The holder of the permit is responsible to construct in accordance with approved plans and documents.
9. The code official ensures that qualified inspection services are provided and documented where required in accordance with the performance-based code and other applicable codes, and testing requirements are met as follows:
 - 9.1. Phase inspections [reference *International Building Code (IBC)* and other *International Codes*].
 - 9.2. Special inspection (reference IBC).
 - 9.3. Testing where required by design documents.
 - 9.4. Documentation that all requirements are met.

The *International Codes* are designed and promulgated to be adopted by reference by legislative action. Jurisdictions wishing to adopt the 2012 ICC *Performance Code for Buildings and Facilities* as an enforceable performance-based regulation governing structures and premises should ensure that certain factual information is included in the adopting legislation at the time adoption is being considered by the appropriate governmental body. The following sample adoption legislation addresses several key elements, including the information required for insertion into the code text.

SAMPLE LEGISLATION FOR ADOPTION OF THE ICC *PERFORMANCE CODE FOR BUILDINGS AND FACILITIES* ORDINANCE NO. _____

A[N] [ORDINANCE/STATUTE/REGULATION] of the [JURISDICTION] adopting the 2012 edition of the ICC *Performance Code for Buildings and Facilities*, regulating and governing the performance-based design, construction, quality of materials, erection, installation, alteration, repair, location, relocation, replacement, addition to, use or maintenance of building and/or fire protection systems in the [JURISDICTION]; providing for the issuance of permits and collection of fees therefor; repealing [ORDINANCE/STATUTE/REGULATION] No. _____ of the [JURISDICTION] and all other ordinances or parts of laws in conflict therewith.

The [GOVERNING BODY] of the [JURISDICTION] does ordain as follows:

Section 1. That a certain document, three (3) copies of which are on file in the office of the [TITLE OF JURISDICTION'S KEEPER OF RECORDS] of [NAME OF JURISDICTION], being marked and designated as the ICC *Performance Code for Buildings and Facilities*, 2009 edition, as published by the International Code Council, be and is hereby adopted as the Performance Code of the [JURISDICTION], in the State of [STATE NAME] for regulating and governing the performance-based design, construction, quality of materials, erection, installation, alteration, repair, location, relocation, replacement, addition to, use or maintenance of building and/or fire protection systems as herein provided; providing for the issuance of permits and collection of fees therefor; and each and all of the regulations, provisions, penalties, conditions and terms of said Performance Code on file in the office of the [JURISDICTION] are hereby referred to, adopted, and made a part hereof, as if fully set out in this legislation, with the additions, insertions, deletions and changes, if any, prescribed in Section 2 of this ordinance.

Section 2. The issuance of permits and collection of fees therefor, and each and all of the regulations, provisions, conditions and terms of the *International Codes*, _____ edition published by the International Code Council, adopted by [JURISDICTION] Ordinance No(s). _____ also on file in the office of the [JURISDICTION] shall provide enforcement, permits, plan review, inspection, fees and Certificate of Occupancy requirements where not specified

in the ICC *Performance Code for Buildings and Facilities*. The [JURISDICTION] also establishes the following performance groups for new and/or existing use groups or specific buildings or facilities for the application of this code¹.

ALLOCATION OF USE AND OCCUPANCY CLASSIFICATIONS AND SPECIFIC BUILDINGS OR FACILITIES TO PERFORMANCE GROUPS

PERFORMANCE GROUP	USE AND OCCUPANCY CLASSIFICATION OR SPECIFIC BUILDINGS OR FACILITIES
I	
II	
III	

Section 3. That [ORDINANCE/STATUTE/REGULATION] No. _____ of [JURISDICTION] entitled [FILL IN HERE THE COMPLETE TITLE OF THE LEGISLATION OR LAWS IN EFFECT AT THE PRESENT TIME SO THAT THEY WILL BE REPEALED BY DEFINITE MENTION] and all other ordinances or parts of laws in conflict herewith are hereby repealed.

Section 4. That if any section, subsection, sentence, clause or phrase of this legislation is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance. The [GOVERNING BODY] hereby declares that it would have passed this law, and each section, subsection, clause or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses and phrases be declared unconstitutional.

Section 5. That nothing in this legislation or in the ICCPC hereby adopted shall be construed to affect any suit or proceeding impending in any court, or any rights acquired, or liability incurred, or any cause or causes of action acquired or existing, under any act or ordinance hereby repealed as cited in Section 3 of this law; nor shall any just or legal right or remedy of any character be lost, impaired or affected by this legislation.

Section 6. That the [JURISDICTION'S KEEPER OF RECORDS] is hereby ordered and directed to cause this legislation to be published. (An additional provision may be required to direct the number of times the legislation is to be published and to specify that it is to be in a newspaper in general circulation. Posting may also be required.)

Section 7. That this law and the rules, regulations, provisions, requirements, orders and matters established and adopted hereby shall take effect and be in full force and effect [TIME PERIOD] from and after the date of its final passage and adoption.

¹The concept of assigning buildings or facilities to performance groups relates to the use of Chapter 3 for the determination of design performance levels. Communities may find that they have unique objectives that would require adjusting the performance groups assigned in Chapter 3 for particular buildings or facilities.

CHAPTER 1 – GENERAL ADMINISTRATIVE PROVISIONS

SECTION 101 INTENT AND PURPOSE

101.1 Purpose.

To provide appropriate health, safety, welfare, and social and economic value, while promoting innovative, flexible and responsive solutions that optimize the expenditure and consumption of resources.

101.2 Intent.

101.2.1 Building.

To provide an acceptable level of health, safety, and welfare and to limit damage to property from events that are expected to impact buildings and structures. Accordingly, Part II of this code intends buildings and structures to provide for:

1. An environment free of unreasonable risk of death and injury from fires.
2. A structure that will withstand loads associated with normal use and of the severity associated with the location in which the structure is constructed.
3. Means of egress and access for normal and emergency circumstances.
4. Limited spread of fire both within the building and to adjacent properties.
5. Ventilation and sanitation facilities to maintain the health of the occupants.
6. Natural light, heating, cooking and other amenities necessary for the well being of the occupants.
7. Efficient use of energy.
8. Safety to fire fighters and emergency responders during emergency operations.

101.2.2 Fire.

Part III of this code establishes requirements necessary to provide an acceptable level of life safety and property protection from the hazards of fire, explosion or dangerous conditions in all facilities, equipment and processes.

SECTION 102 SCOPE

102.1 Building.

Part II of this code provides requirements for buildings and structures and includes provisions for structural strength, stability, sanitation, means of access and egress, light and ventilation, safety to life and protection of property from fire and, in general, to secure life and property from other hazards affecting the built environment. This code includes provisions for the use and occupancy of buildings,

structures, facilities and premises, their alteration, repair, maintenance, removal, demolition, and the installation and maintenance of all amenities including, but not limited to, such services as the electrical, gas, mechanical, plumbing, energy conservation and building transportation systems.

102.2 Fire.

Part III of this code establishes requirements applicable to the use and occupancy of buildings, structures and facilities; and to the prevention, control and mitigation of fire, life safety and property hazards arising from this use and from the storage, handling and use of explosive, flammable and combustible materials, hazardous materials and dangerous operations and processes.

SECTION 103 ADMINISTRATIVE PROVISIONS

103.1 Objective.

To achieve and maintain the level of safety intended by the code.

103.2 Functional statements.

103.2.1 Qualifications.

Design professionals shall possess the knowledge, skills and abilities necessary to demonstrate compliance with this code.

103.2.2 Design document preparation.

Design documents required by this code shall be prepared in adequate detail and submitted for review and approval.

103.2.3 Review.

Design documents submitted in accordance with this code shall be reviewed for code compliance with the appropriate code provisions.

103.2.4 Construction.

Construction shall comply with approved design documents submitted in accordance with this code, and shall be verified and approved to demonstrate compliance with this code.

103.2.5 Facilities and premises.

Facilities and premises shall comply with approved design documents submitted in accordance with this code, and shall be verified and approved to demonstrate compliance with this code.

103.2.6 Equipment and processes.

Equipment and processes and their installation and operation shall comply with approved design documents submitted in accordance with this code, and shall be verified and approved to demonstrate compliance with this code.

103.2.7 Materials and contents.

Materials and contents shall comply with approved design documents submitted in accordance with this code, and shall be verified and approved to demonstrate compliance with this code.

103.2.8 Facility operating policies and procedures.

Policies, operations, training and procedures shall comply with approved documents submitted in accordance with this code, and shall be verified and approved to demonstrate compliance with this code.

103.2.9 Supplemental enforcement.

Administrative provisions of the International Code Council's family of codes regarding plan review, permit issue, inspection and enforcement shall supplement these provisions.

103.2.10 Maintenance.

Maintenance of the performance-based design shall be ensured through the issuance and renewal of certificates over the life of the building.

103.2.11 Management of change.

Written procedures managing change to original design documents, system processes, technology, equipment and facilities shall be established and implemented.

103.2.12 Expected emergency response.

Design documents shall clearly describe the level of response expected by emergency responders.

103.3 Performance requirements.

103.3.1 Building owner's responsibility.

103.3.1.1 Design professional.

The owner shall have the responsibility of retaining and furnishing the services of a design professional, who shall be in responsible charge of preparing and coordinating a complete and comprehensive set of design documents and other services required to prepare reports and other documents in accordance with this code. If the services required by this section are not provided, the use of this code is prohibited.

103.3.1.2 Principal design professional.

When the project requires the services of multiple design professionals, a principal design professional shall be retained and furnished, who shall have the contractual responsibility and authority over all required design professional disciplines to prepare and coordinate a complete and comprehensive set of design documents for the project.

103.3.1.3 Peer review.

The owner shall be responsible for retaining and furnishing the services of a design professional or recognized expert, who will perform as a peer reviewer, when required and approved by the code official. See Section 103.3.6.3 of this code.

103.3.1.4 Costs.

The costs of all special services, including contract review, when required by the code official, shall be borne by the owner.

103.3.1.5 Document retention.

The owner shall retain on the premises all documents and reports required by this code and make them available to the code official upon request.

103.3.1.6 Maintenance.

The owner is responsible to operate and maintain a building, structure or facility designed and built under this code in accordance with the bounding conditions and the operations and maintenance manual.

103.3.1.7 Changes.

The owner shall be responsible to ensure that any change to the facility, process or system does not increase the hazard level beyond that originally designed without approval and that all changes shall be documented in accordance with this code.

103.3.1.8 Special expert.

Where the scope of work is limited or focused in an area that does not require the services of a design professional or the special knowledge and skills associated with the practice of architecture or engineering, a special expert may be employed by the owner as the person in responsible charge of the limited or focused activity. It is the intent of this code that the individual shall possess the qualification characteristics required in Appendix D.

103.3.1.9 Occupant requirements.

The owner is responsible and accountable to ensure that all occupants and employees who are required to take certain actions or perform certain functions in accordance with a performance-based design possess

the required knowledge and skills and are empowered to perform those actions.

103.3.2 Design professional qualifications.

The principal design professional, architects, engineers and other design professionals in responsible charge of their discipline as a member of a design team shall be responsible and accountable to possess the required knowledge and skills to perform design, analysis and verification in accordance with the provisions of this code and applicable professional standards of practice. It is the intent of this code that these individuals possess the qualification characteristics as stated in Appendix D. Qualification statements shall be submitted to the code official for the principal design professional, design professionals and special experts to demonstrate compliance with Appendix D.

103.3.3 Design professionals' and special experts' responsibilities.

103.3.3.1 Principal design professional.

When multiple design disciplines are involved, the principal design professional is responsible to ensure that all design elements are comprehensive and complete before submittals are made to the code official. During the code review process all designated reports, drawings and design documents necessary to demonstrate compliance with the code shall be submitted by the principal design professional. The principal design professional's responsibilities include those of a design professional.

103.3.3.2 Responsibilities.

Design professionals are responsible to apply the performance requirements and acceptable methods approach in Section 104.3 for performance-based designs when using this code. This code requires design analysis and support documentation to demonstrate the design approach and to verify design objectives and compliance with this code.

103.3.3.3 Supporting documentation.

Design professionals have the responsibility to provide the appropriate design analysis, research, computations and documentation to demonstrate compliance with applicable performance requirements of this code and applicable prescriptive code provisions.

103.3.3.4 Acceptable methods.

Design professionals shall use authoritative documents or design guides to determine testing and verification methods for selecting building materials

that are compatible with the building systems approach selected.

103.3.3.5 References.

Design professionals are responsible to document applicable design guides or authoritative documents for a performance-based design and demonstrate how these documents are utilized to substantiate design solutions to show compliance with the provisions of this code. The use of documents that are not accepted as authoritative documents or design guides requires substantiation with the code official to obtain acceptance.

103.3.3.6 Documentation of bounding conditions.

The design professional shall document all bounding conditions and establish thresholds that determine when changes must be approved by the code official.

103.3.3.7 Compliance with bounding conditions.

The design professional(s) shall review the completed construction elements, equipment, furnishings, processes, and contents to verify compliance with the bounding conditions and the critical design features identified in the approved design documents. The code official may require that the principal design professional file a report to verify compliance with the bounding conditions and the critical design features at the completion of the project as a condition of obtaining required certificates.

103.3.3.8 Special expert.

The scope of work of a special expert shall be limited to the area of expertise as demonstrated in the documentation submitted to the code official for review and approval. Where a special expert performs functions of a design, the special expert shall assume the responsibilities of that phase of the design.

103.3.4 Design documentation.

103.3.4.1 General.

The design professional shall prepare appropriate documentation for the project that clearly provides the design approach and rationale for design submittal, construction and future use of the building, facility or process.

103.3.4.1.1 Required documentation.

The documentation for the project shall identify the goals and objectives; the steps undertaken in the analytical analysis; the facility maintenance and testing requirements; and limitations and restrictions on the use of the facility in order to stay within

bounding conditions. When requirements for documentation are specified in applicable engineering or design guides, documentation shall be included in the design documents. Computer modeling documentation shall comply with Appendix E.

103.3.4.1.2 Extent of documentation.

The level of documentation provided shall be adequate to convey the required information clearly to the involved parties and shall be commensurate with the scope and complexity of the project.

103.3.4.1.3 Verification of compliance.

Documentation shall be prepared that clearly verifies that all applicable performance and all applicable prescriptive code provisions have been met.

103.3.4.1.4 Deed restriction.

Design features with bounding conditions that require continued maintenance or supervision by the owner throughout the life of the building, facility or process as conditions of compliance with the objectives of this code, shall be recorded as a deed restriction until released by the code official. When required by the code official, the deed restriction shall be modified to reflect specific changes.

103.3.4.1.5 Phased and partial occupancy.

The design documents shall include an evaluation of hazards and proposed resolution of associated risks during construction in advance of a request for phased or partial occupancy.

103.3.4.1.6 Emergency response capabilities.

Design documentation shall clearly describe the level of response expected by emergency responders under the direct control of the owner. Emergency response capabilities, staffing levels, training requirements and equipment availability shall be documented as a bounding condition.

103.3.4.2 Reports and manuals.

When required by the code official, design documentation shall include a concept report, design report and operations and maintenance manual.

103.3.4.2.1 Concept report.

The concept report shall document the preliminary details of the project, identify the parties involved in the project, and define the goals and objectives to be utilized in the performance-based design analysis. The concept report shall be submitted to the code official as a means of communicating the programming and early schematic phase of a proposed project and to obtain concurrence between

the code official and the project design team on the goals and objectives to be utilized in the analysis. The concept report shall address but not be limited to the following:

1. General project information, including schematic layout and site plan.
2. Definition of project scope.
3. Description of building and occupant characteristics.
4. Project goals and objectives.
5. Selected event scenarios.
6. Methods of evaluation.
7. Qualification statements for principal design professional, design professionals and special experts.
8. Proposed performance and prescriptive code usage.
9. Conceptual site and building plan.

103.3.4.2.2 Design report.

The design report shall document the steps taken in the design analysis, clearly identifying the criteria, parameters, inputs, assumptions, sensitivities and limitations involved in the analysis. The design report shall clearly identify bounding conditions, assumptions and sensitivities that clarify the expected uses and limitations of the performance analysis. This report shall verify that the design approach is in compliance with the applicable codes and acceptable methods and shall be submitted for concurrence by the code official prior to the design documents being completed. The report shall also document the design features to be incorporated based upon the analysis. The design report shall address but not be limited to the following:

1. Project scope.
2. Goals and objectives.
3. Performance criteria.
4. Hazard scenarios.
5. Design fire loads and hazards.
6. Final design.
7. Evaluation.
8. Bounding conditions and critical design assumptions.
9. Critical design features.
10. System design and operational requirements.
11. Operational and maintenance requirements.
12. Commissioning testing requirements and acceptance criteria.
13. Frequency of certificate renewal.
14. Supporting documents and references.
15. Preliminary site and floor plans.

103.3.4.2.3 Operations and maintenance manual.

The operations and maintenance manual shall identify system and component commissioning

requirements and the required interactions between these systems. The manual shall identify for the facility owner and the facility operator those actions that need to be performed on a regular basis to ensure that the components of the performance-based design are in place and operating properly. Furthermore, the operations and maintenance manual shall identify the restrictions or limitations placed upon the use and operation of the facility in order to stay within the bounding conditions of the performance-based design. The operations and maintenance manual shall be submitted at the time of the design documents submittal, unless the code official approves another time based upon the type of project and data needed for a composite review. The operations and maintenance manual shall address but not be limited to the following:

1. Description of critical systems.
2. Description of required system interactions.
3. Occupant responsibilities.
4. Occupant and staff training requirements.
5. Periodic operational requirements.
6. Periodic maintenance requirements.
7. Periodic testing requirements.
8. Limitations on facility operations (due to bounding conditions).
9. Report format for recording maintenance and operation data.
10. System and component commissioning requirements.

103.3.5 Design submittal.

103.3.5.1 General.

Applicable design documents required in Sections 103.3.2, 103.3.3 and 103.3.4 for submittal in this code and other applicable codes under the jurisdiction of the code official shall be submitted to the code official for review. The documents shall be submitted in accordance with the jurisdiction's procedures and in sufficient detail to obtain appropriate permits.

103.3.5.2 Coordination of design documents.

Design documents shall be coordinated by the principal design professional for consistency, compatibility and completeness prior to submittal. Documentation shall be provided to the code official to demonstrate compliance with the performance provisions, including acceptable methods.

103.3.5.3 Performance-based design features.

The design documents shall clearly indicate those areas of the design that are performance-based and shall be provided to the code official.

103.3.5.4 Extent of documentation and references.

The code official shall be provided with sufficient documentation to support the validity, accuracy, relevance and precision of the proposed methods. Copies of referenced documentation shall be made available to the code official.

103.3.5.5 Inspections, testing, operation and maintenance.

The design documents shall specify when and where special inspection and testing are required, the standards of acceptance for demonstrating compliance with the design documents, and operations and maintenance requirements for future use of the building.

103.3.5.6 Management of change.

The submittal shall include appropriate management of change protocol to address how changes in the design documents will be managed for construction, operation and maintenance activities.

103.3.6 Review and approval.

103.3.6.1 Procedures.

Document review and approval shall be accomplished in accordance with the code official's procedures.

103.3.6.2 Review.

The code official shall be responsible to perform a knowledgeable review of the proposed design project to verify compliance with this code, or the code official shall retain competent assistance to perform the review in accordance with acceptable standards of practice.

103.3.6.3 Contract and peer review.

Review may be accomplished by a contract reviewer when the reviewer is assigned by the code official. In addition, the code official may require a peer review process to review design criteria and supporting documents and design documents.

103.3.6.4 Approval.

After documents and other supporting data are reviewed and approved by the code official to verify compliance with the applicable codes, permits may be issued.

103.3.7 Permits and inspections.

103.3.7.1 Permits.

Prior to the start of construction, appropriate permits shall be obtained in accordance with the jurisdiction's procedures and applicable codes.

103.3.7.2 Inspection.

Approved inspections shall be obtained in accordance with the design documents, jurisdiction's procedures and applicable codes.

103.3.7.3 Verification reports.

Inspection, testing and related verification reports shall be filed with the code official to verify compliance with approved design documents and applicable prescriptive code provisions.

103.3.7.4 Product installation.

Compliance shall be verified for materials, fabrication, manufacturer's and engineer's installation procedures by product labeling, certification, quality assurance processes and testing, as applicable, to verify compliance.

103.3.7.5 Compliance verification.

At the completion of construction, the code official shall verify that inspection and testing reports demonstrate compliance with the applicable codes and approved design documents.

103.3.7.6 Operational permits.

Prior to initiating facility uses and processes regulated under Part III of this code, appropriate permits shall be obtained.

103.3.8 Project documentation.

103.3.8.1 Verification of compliance.

Upon completion of the project, documentation shall be prepared that verifies all performance and prescriptive code provisions have been met. When required by the code official in accordance with Section 103.3.3.6, the principal design professional shall file a report that verifies bounding conditions are met.

103.3.8.2 Extent of documentation.

All approved design documents, the operations and maintenance manual, inspection and testing records, and certificates of occupancy with conditions shall be included in the project documentation of the code official's records.

103.3.8.3 Deed restrictions.

Design features with bounding conditions determined by the design professional to require continued operation and maintenance by the owner throughout the life of the building as conditions of compliance with the objectives of this code shall be recorded as a deed restriction as required by the code official until released by the code official.

103.3.8.4 Technical opinion.

The code official has the authority to require a technical opinion and report from an individual or organization with special expertise to identify and develop methods of protection from special hazards and to determine the acceptability of technologies, processes, products, equipment, materials and uses applicable to the design, operation or use of a building or facility. The intent of this code is that the technical opinion and report shall be prepared by a qualified individual. See Appendix D.

103.3.9 Certificates.

103.3.9.1 Certificate of occupancy.

Prior to occupancy of a building, a certificate of occupancy shall be obtained from the code official.

103.3.9.1.1 Continued occupancy.

A certificate of occupancy is required for the continued occupancy of a building.

103.3.9.1.2 Temporary certificate of occupancy.

The code official has the authority to issue a temporary certificate of occupancy for a limited time with specified conditions, providing all life-safety items are accepted.

103.3.9.1.3 Conditional certificate of occupancy.

The code official has the authority to issue a certificate of occupancy with conditions valid for a specified time period that requires continued compliance with bounding conditions and the operations and maintenance manual. Failure to maintain compliance with the conditions of the certificate of occupancy is a violation of this code.

103.3.9.1.4 Revocation and renewal.

Failure of the building owner to demonstrate to the code official that the building is being operated and maintained in compliance with Sections 103.3.1.6 and 103.3.9.1 is cause to revoke or not renew a certificate of occupancy.

103.3.9.2 Certificate of compliance.

Prior to use of a building, facility, process or premises subject to Part III of this code, a certificate of compliance shall be obtained from the code official.

103.3.9.2.1 Continued use.

A certificate of compliance is required for the continued use or occupancy of a facility, process or equipment subject to Part III of this code throughout the life of the facility.

103.3.9.2.2 Renewal frequency.

The certificate of compliance issued subject to Part III of this code shall be renewed at a frequency as determined in the design and approved by the code official.

103.3.9.2.3 Revocation and renewal.

Failure of the owner to demonstrate compliance with this section is cause to revoke or not renew the certificate of compliance.

103.3.10 Maintenance.

103.3.10.1 Owner's responsibility.

The owner is responsible for maintaining the building or facility in accordance with the approved documents.

103.3.10.2 Continued compliance.

Compliance with the operations and maintenance manual and bounding conditions shall be verified throughout the life of the building or facility at a frequency in accordance with the approved documents.

103.3.10.3 Compliance verification.

Documents verifying that the building, facilities, premises, processes and contents are in compliance with the approved design documents and are maintained in a safe manner shall be filed with the code official at a frequency approved by the code official.

103.3.11 Remodeling, addition or change/approval of use.

103.3.11.1 Analysis of change.

The design professional shall evaluate the existing building, facilities, premises, processes, contents and the applicable documentation of the proposed change as it affects portions of the building, facility, premises, processes and contents that were previously designed for compliance under a performance-based code. Prior to any change that was not documented in a previously approved design, the principal design professional shall examine the applicable design documents, bounding conditions, operation and maintenance manuals, and deed restrictions.

103.3.11.2 Coordination of design.

When multiple design disciplines are involved, one design professional shall be responsible to ensure that all design elements are comprehensive and complete before submittals are made to the code official. During the code review process all designated

reports, drawings and design documents necessary to demonstrate compliance with the code shall be submitted by the design professional.

103.3.11.3 Change in activity or contents.

Any change in activity or contents that results in an increase in hazard or risk that exceeds the bounding conditions requires an evaluation and approval. The code official shall have the authority to require a full evaluation of the design.

103.3.11.4 Additions, renovations and related construction changes.

Construction activities in existing buildings, facilities, premises or processes shall be evaluated by a design professional and documented in a written report, which shall be submitted for review and approval in conjunction with the permit request. The report shall identify whether or not the proposed construction exceeds the bounding conditions, which will result in an increase in hazard or risk beyond that expected in the approved original design documents. When bounding conditions are not exceeded, the original design documents need not be revised. When bounding conditions are exceeded, the original design documents shall be revised so that compliance with this code is perpetuated.

103.3.11.5 Designs exceeding bounding conditions.

Where a proposed change exceeds the bounding conditions and does not result in an increase to hazard or risk, as approved by the code official, any person authorized by the laws of the jurisdiction is allowed to prepare design documents and reports for submittal.

103.3.11.6 Change in design objectives and bounding conditions.

When changes are proposed to the design objectives and bounding conditions of an existing building, facility, process or contents, a written report by the design professional shall be prepared to specify the new design objectives and demonstrate compliance with the current code.

103.3.12 Administration and enforcement.

103.3.12.1 Supplemental administrative provisions.

Administrative provisions of the International Code Council's family of codes shall supplement the performance provisions for plan review, permit issuance, inspection, certificate of occupancy or compliance, and enforcement.

103.3.13 Violations.

103.3.13.1 General.

It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, move, remove, demolish or occupy any building, structure or facility regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code.

103.3.13.2 Notice of violation.

The code official shall serve a notice of violation or order on the person responsible for the erection, construction, alteration, extension, repair, moving, removal, demolition or occupancy of a building or facility in violation of the provisions of this code or in violation of a detail statement or construction documents approved thereunder, or in violation of a permit or certificate issued under the provisions of this code. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

103.3.13.3 Violation.

If the notice of violation is not complied with promptly, the code official has the authority to request the legal counsel of the jurisdiction to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the unlawful occupancy of the building or structure in violation of the provisions of this code or of the order or direction made pursuant thereto.

103.3.13.4 Penalties.

Any person who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building, structure or facility in violation of the approved design documents or directive of the code official or of a permit or certificate issued under the provisions of this code shall be subject to penalties as prescribed by law.

SECTION 104 ACCEPTABLE METHODS

104.1 Objective.

To require the use of recognized authoritative documents or design guides for analysis, measurement of performance and determination of criteria used to evaluate compliance with the performance requirements of this code. See Chapter 2 for definitions.

104.2 Functional statements.

104.2.1 Approved methodologies.

Design approaches shall utilize authoritative documents and design guides to demonstrate that designs are based on applicable and valid technical and scientific methodologies.

104.2.2 Design documents.

Design documents shall indicate the method by which the design and construction are to be verified and applicable systems are to be measured.

104.2.3 Testing and inspection.

Testing and inspection of materials and systems shall be based upon applicable authoritative documents and design guides.

104.3 Performance requirements and acceptance method approach.

104.3.1 Construction documents.

Design professionals shall utilize acceptable methods. Construction documents shall contain the design approach, analysis, research, computation and criteria for acceptance that specify the applicable design guides, and authoritative documents utilized to demonstrate that design objectives are met.

104.3.2 Design documents.

Design documents shall include design verification methods that are required to demonstrate compliance with design objectives and applicable authoritative documents and design guides.

104.3.3 Individually substantiated design methods.

Documents that do not meet the criteria for authoritative documents or design guides shall comply with the individually substantiated design method criteria in Appendix C.

104.3.4 Peer review.

Designs that propose to use documents that do not meet the criteria for authoritative documents or design guides shall not be permitted unless approval is given by the code official. The resulting performance-based design shall undergo an independent peer review process.

CHAPTER 2 – DEFINITIONS

SECTION 201 GENERAL

201.1 Scope.

Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings indicated in this chapter.

201.2 Interchangeability.

Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

201.3 Terms not defined in other codes.

Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

SECTION 202 DEFINED TERMS

ACCEPTABLE METHODS. Design, analysis and testing methods that have been approved for use in developing design solutions for compliance with the requirements of this code. See Section 104.

AMENITY. An attribute of, or system in, the building that provides services or functions related to the use of the building by the occupants or that contributes to the comfort of the occupants, and that is not necessary for the minimum protection of the occupants. For example, an automatic sprinkler system is not a building amenity.

ARCHITECT/ENGINEER. The individual architect or engineer who is registered or licensed to practice his or her respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed. See Qualification Characteristics in Appendix D.

AUTHORITATIVE DOCUMENT. A document containing a body of knowledge commonly used by practicing architects or engineers. It represents the state of the art, including accepted engineering practices, test methods, criteria, loads, safety factors, reliability factors and similar technical matters. The document portrays the standard of care normally observed with a particular discipline. The content is promulgated through an open consensus process or a review by professional peers conducted by recognized authoritative professional societies, codes

or standards organizations, or governmental bodies.

BOUNDING CONDITIONS. Conditions that, if exceeded, invalidate the performance-based design. These could be maximum allowable conditions such as fuel load or type and arrangement of fuel load that must be maintained throughout the life of a building to ensure that design parameters are not exceeded.

CODE. The term used in this document to refer to the *ICC Performance Code for Buildings and Facilities*. Other codes in the International Code Council's family of codes and the *National Electrical Code* are identified where used.

COMMISSIONING. The process of verifying that a system meets design, technical standards and code expectations via inspection, testing and operational functionality.

CONSULTANT. An individual who provides specialized services to an owner, designer, code official or contractor.

CONTRACT REVIEW. Plan review, as defined below, performed by a consultant who is retained by the code official for that purpose.

DESIGN DOCUMENTS. Design drawings, computations, geotechnical and other reports, specifications and related documentation that are submitted to governmental agencies for approval and for the purpose of constructing buildings and structures.

DESIGN GUIDE. A document containing a body of knowledge or information used by practicing architects and engineers that is not required to meet an open consensus requirement. It represents accepted architectural/engineering principles and practices, tests and test data, criteria, loads, safety factors, reliability factors and similar technical data.

DESIGN PROFESSIONAL. An individual who is registered or licensed to practice his or her respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

ESSENTIAL FACILITIES. Buildings and other structures that are intended to remain operational in the event of extreme environmental loading from flood, wind, snow or earthquake.

FACILITY. (General Application) Includes all buildings or structures (permanent or temporary), including all fire- and life-safety systems installed therein. A facility includes interior and exterior storage areas, equipment and processes dealing with flammable and combustible substances and hazardous materials, on site. The term includes tents, membrane structures, mobile and manufactured structures, storage tanks, piers, wharves and all required access roads and areas.

FACILITY. (Only applicable to Section 702). The entire building or any portion of a building, structure or area, including the site on which such building, structure or area is located, wherein specific services are provided or activities are performed.

PEER REVIEW. An independent and objective technical review of the design of a building or structure to examine the proposed conceptual and analytical concepts, objectives and criteria of the design and construction. It shall be conducted by an architect or engineer who has a level of experience in the design of projects similar to the one being reviewed at least comparable to that of the architect or engineer responsible for the project.

PERFORMANCE-BASED DESIGN. An engineering approach to design elements of a building based on agreed upon performance goals and objectives, engineering analysis and quantitative assessment of alternatives against the design goals and objectives using accepted engineering tools, methodologies and performance criteria.

PLAN REVIEW. A review of the construction documents by the code official to verify conformance to applicable performance and prescriptive code requirements.

PRESCRIPTIVE CODES. The International Code Council's family of codes, which provide specific

(design, construction and maintenance) requirements for building, energy conservation, fire prevention, mechanical, plumbing and so forth.

PRINCIPAL DESIGN PROFESSIONAL. An architect or engineer who is responsible to the owner and has contractual responsibility and authority over all design professional disciplines to prepare and coordinate a complete and comprehensive set of design documents for a project.

QUALITY ASSURANCE. Inspection by code officials, and special inspection and testing by qualified persons and observation by architects/engineers, where applicable, of the construction of a building or structure to verify general conformance with the construction documents, and applicable performance and prescriptive code requirements.

SAFE PLACE. An interior or exterior area wherein protection from hazards is provided by construction or appropriate separation distance.

SAFETY SYSTEMS. Designed systems in the building provided to serve as the protection for the occupants and the building and contents from hazards.

SERIOUS INJURY. An injury requiring hospitalization or multiple visits to a healthcare provider to effect treatment.

SPECIAL EXPERT. An individual who has demonstrated qualifications in a specific area, outside the practice of architecture or engineering, by education, training and experience.

THIRD-PARTY REVIEW. A term associated with quality assurance and independence from another party whose work product is being reviewed. Third-party review does not apply to the peer review process.

CHAPTER 3 – DESIGN PERFORMANCE LEVELS

SECTION 301 MINIMUM PERFORMANCE

301.1 Purpose.

This chapter provides the basis for developing the acceptable level of design based upon building use, risk factors and magnitudes of event. Magnitudes are defined in subsequent chapters of this code but interrelate with this chapter in the development of design methods for the mitigation of hazards.

301.2 Objective.

To establish performance groups for buildings and facilities and to establish minimum acceptable losses based upon those performance groups.

301.3 Functional statements.

301.3.1 Performance level.

The performance of a building or facility is based on the ability of the building or facility to tolerate specified magnitudes of event within tolerable limits of damage.

301.3.2 Demonstration of performance.

Performance is acceptable when the design performance levels are demonstrated to be met or exceeded, to the satisfaction of the code official, in accordance with the assigned or designated use groups, performance groups, magnitudes of event and maximum tolerable damage limits; and the objectives, functional statements and performance requirements of this code.

SECTION 302 USE AND OCCUPANCY CLASSIFICATION

302.1 General.

The objective of the assignment of use and occupancy classification is to identify the primary uses of buildings and facilities, and portions of buildings and facilities, and to identify risk factors associated with these uses, in order to facilitate design and construction in accordance with other provisions of this code.

302.2 Determination of use.

In determining the primary use of a building or facility, or portion of a building or facility, the following shall be considered:

302.2.1 Principal purpose or function.

The principal purpose or function of the building or facility; and

302.2.2 Hazards.

The hazard-related risk(s) to the users of the building or facility.

302.3 Guidance.

The use and occupancy classifications found in the *International Building Code* shall be permitted to be used for guidance in determining the principal purposes or functions for buildings or facilities.

302.4 Risk factors.

In determining the hazard-related risk(s) to users of buildings and facilities, the following risk factors shall be considered:

302.4.1 Nature of the hazard.

The nature of the hazard, whether it is likely to originate internal or external to the building or facility, and how it may impact the occupants, the building or facility, and the contents.

302.4.2 Number of occupants.

The number of persons normally occupying, visiting, employed in or otherwise using the building, facility or portion of the building or facility.

302.4.3 Length of occupancy.

The length of time the building or facility is normally occupied by people.

302.4.4 Sleeping characteristics.

Whether people normally sleep in the building.

302.4.5 Familiarity.

Whether the building or facility occupants and other users are expected to be familiar with the building or facility layout and means of egress.

302.4.6 Vulnerability.

Whether a significant percentage of the building or facility occupants are, or are expected to be, members of vulnerable population groups such as infants, young children, elderly persons, persons with physical disabilities, persons with mental disabilities, or persons with other conditions or impairments that could affect their ability to make decisions, egress without the physical assistance of others or tolerate adverse conditions.

302.4.7 Relationships.

Whether a significant percentage of building or facility occupants and other users have family or dependent relationships.

been allocated to performance groups using the risk factors identified in Section 302.4. Specific buildings and facilities have been allocated to performance groups using the risk factors identified in Section 302.4 combined with the relative importance of protecting the building or facility to the community. These performance group allocations are shown in Table 303.1.

SECTION 303 PERFORMANCE GROUPS**303.1 Performance group allocation.**

Use groups and hazard-related occupancies have

TABLE 303.1 PERFORMANCE GROUP CLASSIFICATIONS FOR BUILDINGS AND FACILITIES

PERFORMANCE GROUP	USE AND OCCUPANCY CLASSIFICATIONS FOR SPECIFIC BUILDINGS OR FACILITIES
I	Buildings and facilities that represent a low hazard to human life in the event of failure, including, but not limited to: <ol style="list-style-type: none"> 1. Agricultural facilities. 2. Certain temporary facilities. 3. Minor storage facilities.
II	All buildings and facilities except those listed in Performance Groups I, III and IV.
III	Buildings and facilities that represent a substantial hazard to human life in the event of failure, including, but not limited to: <ol style="list-style-type: none"> 1. Buildings and facilities where more than 300 people congregate in one area. 2. Buildings and facilities with elementary school, secondary school or day care facilities with a capacity greater than 250. 3. Buildings and facilities with a capacity greater than 500 for colleges or adult education facilities. 4. Health-care facilities with a capacity of 50 or more residents but not having surgery or emergency treatment facilities. 5. Jails and detention facilities. 6. Any other occupancy with an occupant load greater than 5,000. 7. Power-generating facilities, water treatment for potable water, wastewater treatment facilities and other public utilities facilities not included in Performance Group IV. 8. Buildings and facilities not included in Performance Group IV containing sufficient quantities of highly toxic gas or explosive materials capable of causing acutely hazardous conditions that do not extend beyond property boundaries.
IV	Buildings and facilities designated as essential facilities, including, but not limited to: <ol style="list-style-type: none"> 1. Hospitals and other health care facilities having surgery or emergency treatment facilities. 2. Fire, rescue and police stations and emergency vehicle garages.

	<p>3. Designated earthquake, hurricane or other emergency shelters.</p> <p>4. Designated emergency preparedness, communication, and operation centers and other facilities required for emergency response.</p> <p>5. Power-generating stations and other utilities required as emergency backup facilities for Performance Group IV buildings or facilities.</p> <p>6. Buildings and facilities containing highly toxic gas or explosive materials capable of causing acutely hazardous conditions beyond the property boundaries.</p> <p>7. Aviation control towers, air traffic control centers and emergency aircraft hangars.</p> <p>8. Buildings and facilities having critical national defense functions.</p> <p>9. Water treatment facilities required to maintain water pressure for fire suppression.</p> <p>10. Ancillary structures (including, but not limited to, communication towers, fuel storage tanks or other structures housing or supporting water or other fire suppression material or equipment) required for operation of Performance Group IV structures during an emergency.</p>
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303.2 Unique performance group allocation.

303.3 Magnitudes of event and level of damage.

TABLE 303.3 MAXIMUM LEVEL OF DAMAGE TO BE TOLERATED BASED ON PERFORMANCE GROUPS AND DESIGN EVENT MAGNITUD

303.4 Performance groups.

There are four performance groups (PG), identified as I, II, III and IV.

303.4.1 Performance Group I.

The minimum design performance level with which all buildings or facilities posing a low risk to human life, should the buildings or facilities fail, shall comply.

303.4.2 Performance Group II.

The minimum design performance level with which all buildings or facilities subject to this code, except those classified as PG I, PG III or PG IV, shall comply.

303.4.3 Performance Group III.

The minimum design performance level with which buildings or facilities of an increased level of societal benefit or importance shall comply.

303.4.4 Performance Group IV.

The minimum design performance level with which buildings or facilities that present an unusually high risk or that are deemed essential facilities shall comply.

303.5 Alternative performance group designations.

The performance group for specific buildings or facilities or classes of buildings or facilities are permitted to be redesignated with the approval of the code official. If a higher design performance level is desired, the design team, with the approval of the code official, may choose a higher performance group. For existing buildings or facilities, the code official is authorized to adjust tolerable limits of impact to a building or facility and its contents.

SECTION 304 MAXIMUM LEVEL OF DAMAGE TO BE TOLERATED

304.1 General.

Design performance levels establish how a building or facility is expected to perform, in terms of tolerable limits, under varying load conditions. For each magnitude of event (small to very large), considered as a design load, based on realistic event scenarios, the design shall provide high confidence that the corresponding maximum level of damage to be tolerated for the appropriate performance group will be met. This relationship is illustrated in Table 303.3.

304.2 Level of impact.

There are four design performance levels defined in

terms of tolerable limits of impact to the building or facility, its contents and its occupants: mild, moderate, high and severe.

304.2.1 Mild impact.

The tolerable impacts of the design loads are assumed as follows:

304.2.1.1 Structural damage.

There is no structural damage and the building or facility is safe to occupy.

304.2.1.2 Nonstructural systems.

Nonstructural systems needed for normal building or facility use and emergency operations are fully operational.

304.2.1.3 Occupant hazards.

Injuries to building or facility occupants from hazard-related applied loads are minimal in numbers and minor in nature. There is a very low likelihood of single or multiple life loss. The nature of the applied load (i.e., fire hazard) may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

304.2.1.4 Overall extent of damage.

Damage to building or facility contents from hazard-related applied loads is minimal in extent and minor in cost.

304.2.1.5 Hazardous materials.

Minimal hazardous materials are released to the environment.

304.2.2 Moderate impact.

The tolerable impacts of the design loads are assumed as follows:

304.2.2.1 Structural damage.

There is moderate structural damage, which is repairable; some delay in reoccupancy can be expected.

304.2.2.2 Nonstructural systems.

Nonstructural systems needed for normal building or facility use are fully operational, although some cleanup and repair may be needed. Emergency systems remain fully operational.

304.2.2.3 Occupant hazards.

Injuries to building or facility occupants from hazard-related applied loads may be locally significant, but generally moderate in numbers and in nature. There is a low likelihood of single life loss with a very low

likelihood of multiple life loss. The nature of the applied load (i.e., fire hazard) may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

304.2.2.4 Overall extent of damage.

Damage to building or facility contents from hazard-related applied loads may be locally significant, but is generally moderate in extent and cost. The nature of the applied load (i.e., fire hazard) may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

304.2.2.5 Hazardous materials.

Some hazardous materials are released to the environment, but the risk to the community is minimal. No emergency relocation is necessary.

304.2.3 High impact.

The tolerable impacts of the design loads are assumed as follows:

304.2.3.1 Structural damage.

There is significant damage to structural elements but no large falling debris; repair is possible. Significant delays in reoccupancy can be expected.

304.2.3.2 Nonstructural systems.

Nonstructural systems needed for normal building or facility use are significantly damaged and inoperable; egress routes may be impaired by light debris; emergency systems may be significantly damaged, but remain operational.

304.2.3.3 Occupant hazards.

Injuries to building or facility occupants from hazard-related applied loads may be locally significant with a high risk to life, but are generally moderate in numbers and in nature. There is a moderate likelihood of single life loss, with a low probability of multiple life loss. The nature of the applied load (i.e., fire hazard) may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

304.2.3.4 Overall extent of damage.

Damage to building or facility contents from hazard-related applied loads may be locally total and generally significant. The nature of the applied load (i.e., fire hazard) may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

304.2.3.5 Hazardous materials.

Hazardous materials are released to the environment with localized relocation needed for buildings and facilities in the immediate vicinity.

304.2.4 Severe impact.

The tolerable impacts of the design loads are assumed as follows:

304.2.4.1 Structural damage.

There is substantial structural damage, but all significant components continue to carry gravity load demands. Repair may not be technically possible. The building or facility is not safe for reoccupancy, as reoccupancy could cause collapse.

304.2.4.2 Nonstructural systems.

Nonstructural systems for normal building or facility use may be completely nonfunctional. Egress routes may be impaired; emergency systems may be substantially damaged and nonfunctional.

304.2.4.3 Occupant hazards.

Injuries to building or facility occupants from hazard-related applied loads may be high in numbers and significant in nature. Significant risk to life may exist. There is a high likelihood of single life loss and a moderate likelihood of multiple life loss. The nature of the applied load (i.e., fire hazard) may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

304.2.4.4 Overall extent of damage.

Damage to building or facility contents from hazard-related applied loads may be total. The nature of the applied load (i.e., fire hazard) may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

304.2.4.5 Hazardous materials.

Significant hazardous materials are released to the environment, with relocation needed beyond the immediate vicinity.

SECTION 305 MAGNITUDES OF EVENT

305.1 General.

Magnitude of event encompasses all loads that can be reasonably expected to impact on a building or facility, its users and its contents, during construction and throughout its intended life. This includes building and facility-related and occupancy-related loads, as well as loads resulting from natural and

technological hazards. Determination of magnitude of event shall take into account the design performance levels established by this code, the risk factors identified in Section 302.4 and specific performance criteria established by relevant authoritative documents.

305.1.1 Natural hazards.

The types of loads affecting main-force-resisting systems, components and contents that may be reasonably expected to impact on the building or facility, its users and its contents during its intended life are provided in Chapter 5 of this code.

305.1.2 Technological hazards.

The types of loads due to technological hazards that may be reasonably expected to impact on the building or facility, its users and its contents during construction and throughout its intended life include, but are not limited to:

305.1.2.1

Fires (Chapters 6, 16 and 17).

305.1.2.2

Explosions (Chapters 5, 22 and Section 801).

305.1.2.3

Toxic materials (Chapter 22 and Section 801).

305.1.2.4

Corrosive materials (Chapter 22 and Section 801).

305.1.2.5

Infectious materials or agents (Chapter 22 and Section 801).

305.2 Definition of magnitude of event.

Magnitude of event may be defined, quantified and expressed deterministically or probabilistically according to the best current practice of the relevant profession as published in recognized authoritative documents. In some authoritative documents, magnitude of event may be expressed only for a single performance group (e.g., nominal live and dead loads are defined only for Performance Group II). In other cases, magnitude of event may be provided for all performance levels (e.g., seismic provisions). In all cases, it is the responsibility of the design engineer to demonstrate that the design performance levels are met for the loads anticipated.

305.2.1 Classification of event magnitude.

For the purpose of this code, the magnitude of event shall be classified as: small, medium, large and very large. Where authoritative documents do not present magnitude of event in this format, it will be the responsibility of the designer to relate the loads to this format and to demonstrate that the minimum design performance levels will be met by the proposed design.

CHAPTER 4 – RELIABILITY AND DURABILITY

SECTION 401 RELIABILITY

401.1 Objective.

To ensure reliability of the system necessary to meeting the performance objectives of building, facility or processes in accordance with the design.

401.2 Functional statements.

401.2.1 Design, installation and maintenance.

Design, install and maintain systems, system components and equipment that provide a safety function in strict accordance with the manufacturers' instructions and with any applicable codes and standards.

401.2.2 Testing and inspection.

Test and inspect systems, system components and equipment that provide a safety function in strict accordance with the manufacturers' instructions and with any applicable codes and standards for both the methods employed and the frequency.

401.2.3 Active fire protection systems.

Active fire protection systems such as fire alarm, suppression and smoke management systems shall undergo commissioning testing when first placed into service or following any substantial alteration.

401.2.4 Training.

Provide appropriate training to any people who operate, test, maintain or interpret information from any safety systems. Where such work is done by contractors, assure that they have the necessary training and skills.

401.3 Performance requirements.

401.3.1 Qualifications.

Design, installation and maintenance shall be performed only by qualified people as approved. Certification or records of training shall be provided.

401.3.2 Documentation.

Documentation shall be maintained at the building that details the systems installed and their required maintenance and testing methods and frequency.

Records of such maintenance and testing shall also be maintained that demonstrate compliance, the persons conducting the work and their qualifications.

SECTION 402 DURABILITY

402.1 Objective.

To assist in the selection of appropriate materials and construction systems.

402.2 Functional statement.

To ensure that a building will continue to satisfy the objectives of this code throughout its life.

402.3 Performance requirements.

402.3.1 Normal maintenance.

From the time a certificate of occupancy is issued, primary building elements shall, with only normal maintenance, continue to satisfy the performance requirements of this code for the intended life of the building.

402.3.2 Intended life of a building.

Where the useful life of building or facility elements or systems is less than the intended life of the building, provisions shall be made for timely replacement of those elements, so that the objective of this code and the design are maintained.

402.3.3 Damage and deterioration.

Where damage or deterioration to building or facility elements or systems will impact the objectives of this code or the design, those elements or systems shall be repaired or replaced in order to maintain the level of performance intended by this code.

402.3.4 Determination of durability and service life.

In determining the useful service life of building elements, products or systems, an acceptable method for determining durability and service life shall be used.

CHAPTER 5 – STABILITY

SECTION 501 STRUCTURAL FORCES

501.1 Objective.

To provide a desired level of structural performance when structures are subjected to the loads that are expected during construction or alteration and throughout their intended lives.

501.2 Functional statements.

501.2.1 Life safety and injury prevention.

Structures shall be designed and constructed to prevent injury to occupants due to loading of a structural element or system consistent with the design performance level determined in Chapter 3.

501.2.2 Property and amenity protection.

Structures shall be designed and constructed to prevent loss of property and amenity consistent with the design performance level determined in Chapter 3.

501.3 Performance requirements.

501.3.1 Stability.

Structures, or portions thereof, shall remain stable and not collapse during construction or alteration and throughout their lives.

501.3.2 Disproportionate failure.

Structures shall be designed to sustain local damage, and the structural system as a whole shall remain stable and not be damaged to an extent disproportionate to the original local damage.

501.3.3 Loss of amenity.

Structures, or portions thereof, shall have a low probability of causing damage or loss of amenity through excessive deformation, vibration or degradation during construction or alteration and throughout their lives.

501.3.4 Expected loads.

Structures, or portions thereof, shall be designed and constructed taking into account all expected loads, and combination of loads, associated with the event(s) magnitude(s) that would affect their performance, including, but not limited to:

1. Dead loads.
2. Live loads.
3. Impact loads.
4. Explosion loads.

5. Soil and hydrostatic pressure loads.

6. Flood loads (mean return period).

Small: 100 years

Medium: 500 years

Large: Determined on a site-specific basis

Very Large: Determined on a site-specific basis

7. Wind loads (mean return period).

Small: 50 years

Medium: 75 years

Large: 100 years

Very Large: 125 years

8. Wind-borne debris loads.

9. Snow loads (mean return period).

Small: 25 years

Medium: 30 years

Large: 50 years

Very Large: 100 years

10. Rain loads. See Table 501.3.4.

11. Earthquake loads (mean return period).

Small: 25 years

Medium: 72 years

Large: 475 years, but need not exceed two-thirds of the intensity of very large loads

Very Large: 2,475 years. At sites where the 2,475-year, 5-percent damped spectral response acceleration at a 0.3-second period exceeds 1.5 g and at a 1-second period exceeds 0.6 g, very large ground shaking demands need not exceed a 5-percent damped response spectrum that at each period is 150 percent of the median spectral response acceleration ordinate resulting from a characteristic earthquake on any known active fault in the region.

12. Ice loads, atmospheric icing (mean return period).

Small: 25 years

Medium: 50 years

Large: 100 years

Very Large: 200 years

13. Hail loads.

14. Thermal loads.

TABLE 501.3.4 RAIN LOADS

MAGNITUDE OF EVENT	DRAINAGE SYSTEM	MRI (YEARS)	STORM DURATION (MIN.)
Small	Primary	25	60
Small	Secondary	25	15
Medium	Primary	50	60
Medium	Secondary	50	15
Large	Primary	100	60

Large	Secondary	100	15
Very Large	Primary	100	30
Very Large	Secondary	100	10

501.3.5 Safety factors.

The design of buildings and structures shall consider appropriate factors of safety to provide adequate performance from:

1. Effects of uncertainties resulting from construction activities.
2. Variation in the properties of materials and the characteristics of the site.
3. Accuracy limitations inherent in the methods used to predict the stability of the building.

4. Self-straining forces arising from differential settlements of foundations and from restrained dimensional changes due to temperature, moisture, shrinkage, creep and similar effects.

501.3.6 Demolition and alteration.

The demolition or alteration of buildings and structures shall be carried out in a way that avoids the likelihood of premature collapse.

501.3.7 Site work.

Site work, where necessary, shall be carried out to provide stability for construction on the site and avoid the likelihood of damage to adjacent property.

CHAPTER 6 – FIRE SAFETY

SECTION 601 SOURCES OF FIRE IGNITION

601.1 Objective.

To prevent unwanted ignition caused by building equipment and systems.

601.2 Functional statements.

601.2.1 Fuel-burning appliances and services.

Fuel-burning appliances and services shall be installed in a manner that reduces their potential as a source of fire ignition.

601.2.2 Electrical equipment, appliances and services.

Electrical equipment, appliances and services shall be installed in a manner that reduces their potential as a source of fire ignition.

601.3 Performance requirements.

601.3.1 Uncontrolled combustion and explosion.

Fuel-burning appliances and services shall be installed so that the appliance or service will not cause uncontrolled combustion or explosion.

601.3.2 Fuel-burning appliances and services as sources of ignition.

Fuel-burning appliances and services shall be installed so that they will not become a source of ignition.

601.3.3 Sparks and arcing.

Electrical equipment, appliances and services shall be installed so that they will not allow sparks or arcing to escape their enclosures.

601.3.4 Electrical equipment, appliances and services.

Electrical equipment, appliances and services shall be installed so that they will not become a source of ignition.

601.3.5 Flammable, combustible and explosive atmospheres.

Separate ignition sources from areas where a flammable, combustible or explosive atmosphere may exist.

SECTION 602 LIMITING FIRE IMPACT

602.1 Objective.

To provide an acceptable level of fire safety

performance when facilities are subjected to fires that could occur in the fire loads that may be present in the facility during construction or alteration and throughout the intended life.

602.2 Functional statement.

Buildings shall be designed with safeguards against the spread of fire so that no person not directly adjacent to or involved in the ignition of a fire shall suffer serious injury or death from a fire and so that the magnitude of the property losses are limited as follows:

Performance Group I—High
Performance Group II—Moderate
Performance Group III—Mild
Performance Group IV—Mild

602.2.1 Building and adjacent buildings.

Buildings and facilities shall be designed and constructed so that the building and adjacent buildings or facilities and their occupants, contents and amenities are appropriately protected from the impact of fire and smoke.

602.2.2 Needs of fire fighters.

Buildings and facilities shall be designed and constructed so that fire fighters can appropriately perform rescue operations, protect property, and utilize fire-fighting equipment and controls.

602.3 Performance requirements.

See Section 1701.3.

CHAPTER 7 – PEDESTRIAN CIRCULATION

SECTION 701 MEANS OF EGRESS

701.1 Objective.

To protect people during egress and rescue operations.

701.2 Functional statement.

Enable occupants to exit the building, facility and premise or reach a safe place as appropriate to the design performance level determined in Chapter 3.

701.3 Performance requirements.

See Section 1901.3.

SECTION 702 ACCESSIBILITY

702.1 Objective.

To provide people with disabilities reasonable use of the built environment in a manner consistent with that provided to people without disabilities in nonemergency conditions.

702.2 Functional statement.

Buildings and their site-adjacent facilities shall allow all people, including but not limited to people with disabilities, functional use of spaces based on a space's intended purpose.

702.3 Performance requirements.

Safe and usable routes shall be provided that allow people to:

1. Approach, enter and leave buildings and sites to and from adjacent transportation stops, walkways and parking areas.
2. Move within and use building and site spaces based on a facility's intended purpose.

SECTION 703 TRANSPORTATION EQUIPMENT

703.1 Objective.

To ensure the safety of all people using, maintaining

and inspecting elevators, escalators and similar building transportation equipment inside or outside of buildings.

703.2 Functional statement.

Building transportation equipment installations for access into, within and outside of buildings shall provide for the safe movement of all people and the safety of maintenance and inspection personnel.

703.3 Performance requirements.

703.3.1 General.

Building transportation equipment shall:

1. Move people safely when starting, stopping, accelerating, decelerating or changing direction of travel, and hold the rated loads.
2. Be constructed to avoid the likelihood of people falling, tripping, becoming caught and coming in contact with sharp edges or projections under normal and reasonably foreseeable conditions of use.
3. Be guided and have sufficient running clearances.
4. Have controls to stop and prevent restarting in the event of activation of a safety device.
5. Be capable of being isolated for inspection, testing and maintenance.
6. Have adequate lighting and ventilation during normal conditions or upon loss of normal power.

703.3.2 Elevators.

Elevators shall be designed and constructed to provide:

1. A means of communication for trapped passengers in stalled elevators.
2. Emergency recall operation that discharges passengers at the required designated or alternate landing in the event of a fire emergency.
3. Emergency in-car operation for fire-fighting and rescue operations.
4. An environment that ensures the safe operation of the equipment for the anticipated use or application.

CHAPTER 8 – SAFETY OF USERS

SECTION 801 HAZARDOUS MATERIALS

801.1 Objective.

To protect people and property from the consequences of unauthorized discharge, fires or explosions involving hazardous materials.

801.2 Functional statements.

801.2.1 Prevention.

Provide adequate safeguards to minimize the risk of unwanted releases, fires or explosions involving hazardous materials as appropriate to the design performance level determined in Chapter 3.

801.2.2 Mitigation.

Provide adequate safeguards to minimize the consequences of an unsafe condition involving hazardous materials during normal operations and in the event of an abnormal condition in accordance with the design performance level determined in Chapter 3.

801.3 Performance requirements.

See Section 2201.3.

SECTION 802 HAZARDS FROM BUILDING MATERIALS

802.1 Objective.

To safeguard people from injury caused by exposure to hazards from building materials.

802.2 Functional statement.

Building materials that are potentially hazardous shall be used in ways to avoid undue risk to people.

802.3 Performance requirements.

802.3.1 Construction materials.

The quantities of gas, liquid, radiation or solid particles emitted by materials used in the construction of buildings shall not give rise to harmful concentrations at the surface of the material where the material is exposed or in the atmosphere of any space.

802.3.2 Glazing.

Glass or other brittle materials with which people are likely to come into contact shall comply with one or more of the following:

1. If broken upon impact, break in a way that is unlikely to cause injury.
2. Resist a reasonably foreseeable impact without breaking.
3. Be reasonably protected from impact.

SECTION 803 PREVENTION OF FALLS

803.1 Objective.

To prevent people from unintentionally falling from one level to another.

803.2 Functional statement.

Buildings and their facilities shall be constructed to reduce the likelihood of unintentional falls.

803.3 Performance requirements.

803.3.1 Required barriers.

A barrier shall be provided where people could fall 30 inches (762 mm) or more from an opening in the external envelope or floor of a building or its facilities.

803.3.2 Roofs.

Roofs with permanent access shall have barriers provided.

803.3.3 Barrier construction.

Barriers shall be constructed and installed appropriate to the hazard.

803.3.4 Openings in barriers.

When barriers have openings, the openings shall be of an appropriate size and configuration to keep people from falling through based upon the anticipated age of the occupants.

SECTION 804 CONSTRUCTION AND DEMOLITION HAZARDS

804.1 Objective.

To safeguard people from injury or illness and to protect property from damage during the construction or demolition processes.

804.2 Functional statement.

Provisions are required during construction and demolition work to:

1. Protect authorized personnel from injury resulting from falling objects, fire, blasts, tripping or falling, or any other risk posed by the construction or demolition operation.
2. Prevent the entry of unauthorized personnel on the construction or demolition site.
3. Protect property off site from damage resulting from falling objects, fire, blasts or any other risk posed by the construction or demolition operations.

804.3 Performance requirements.

804.3.1 Operations and procedures.

Sequencing of tasks, procedural methods and equipment shall be such that:

1. Personnel are protected from injury and illness attributable to hazards present because of the given operation.
2. Adjacent property, property on site and equipment are protected from damage from execution of the given tasks.
3. Safety procedures limit the accumulation of combustible materials on site and provide safeguards for equipment and operations that represent ignition sources.

804.3.2 Protection from natural hazards.

The structure under construction shall be protected from damage due to wind, rain or other natural hazards likely to occur during construction.

804.3.3 Protection of personnel.

Provisions for personnel movement, transport and support shall be such that:

1. Personnel are protected from injury due to falling.
2. Personnel are protected from injury due to falling objects.
3. Personnel are protected from injury that could be caused by the particular operations being conducted.
4. Exposure to materials that are known to be health hazards is eliminated.

804.3.4 Unauthorized entry.

The job site shall be protected from the intrusion of unauthorized personnel.

SECTION 805 SIGNS

805.1 Objective.

To identify essential features of the building to its users.

805.2 Functional statement.

Signs shall identify escape and rescue routes, hazards, accessible elements where not all elements are accessible and other essential features of a

building.

805.3 Performance requirements.

805.3.1 Visibility.

Signs shall be clearly visible and readily recognizable under the conditions expected for their purpose.

805.3.2 Identification of exits and safe places.

Signs shall identify exits and safe places, and be located sufficiently to mark escape/rescue routes and guide people to exits and safe places.

805.3.3 Power failure.

Signs that identify exits, safe places and escape/rescue routes shall remain visible in the event of a power failure.

805.3.4 Hazard identification.

Signs indicating hazards shall be provided in sufficient locations to notify people before they encounter the hazard.

805.3.5 Accessible building feature signage.

Signs shall identify accessible facilities and be located sufficiently to mark accessible routes.

SECTION 806 EMERGENCY NOTIFICATION

806.1 Objective.

To provide notification of the need to take some manual action to preserve the safety of occupants or to limit property damage.

806.2 Functional statements.

806.2.1 Occupant notification.

Where required, adequate means of occupant notification shall be provided to warn of the presence of a fire or other emergency in sufficient time to enable occupants to take the contemplated action without being exposed to unreasonable risk of injury or death.

806.2.2 Emergency responder notification.

Where systems are designed to notify emergency responders, such systems shall indicate the type of emergency and the location of the building. Where buildings are large enough to expect difficulty in prompt location of the fire or other public emergency, identification of the fire zone of origin shall be provided at the building.

806.3 Performance requirements.

806.3.1 Type of notification.

Notification of occupants shall be by means appropriate to the needs of the occupants, the use of the building and the emergency egress strategy employed.

806.3.2 Sleeping occupants.

When required by the anticipated use of the building, notification systems shall be capable of alerting sleeping occupants in reasonable time to enable them to reach a safe place before the occurrence of untenable conditions at any point along the primary egress path.

CHAPTER 9 – MOISTURE

SECTION 901 SURFACE WATER

901.1 Objective.

To safeguard people from injury and protect the building or other property from damage caused by surface water and to protect outfalls of drainage systems that may become contaminated from on-site hazardous material storage.

901.2 Functional statements.

901.2.1 Surface water hazards.

Buildings and sites shall be constructed in a way that protects people and other property from the adverse effects of surface water.

901.2.2 Hazardous materials contamination.

Building or building sites used for the storage or use of hazardous materials shall include provisions to ensure that hazardous materials are not accidentally transported across property lines into drainage outfalls.

901.3 Performance requirements.

901.3.1 Removal of surface water.

Surface water shall be removed in a manner that avoids damage or nuisance to the building or other property.

901.3.2 Contaminated water.

Surface water or water used for fire fighting and other uses shall be routed so as not to transport hazardous material across property lines or into drainage outfalls.

901.3.3 Surface water runoff.

Surface water drainage systems shall convey surface water runoff to an appropriate outfall.

901.3.4 Blockage.

Drainage systems shall be constructed so as to avoid the likelihood of blockage.

901.3.5 Access for cleaning.

Drainage systems shall be constructed so as to have reasonable access for cleaning.

SECTION 902 EXTERNAL MOISTURE

902.1 Objective.

To safeguard people from injury and property from damage that could result from external moisture entering the building.

902.2 Functional statement.

Buildings shall be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.

902.3 Performance requirements.

902.3.1 Water penetration.

Roofs and exterior walls shall prevent the penetration of water that could cause damage to building elements.

902.3.2 Building elements in contact with the ground.

Walls, floors and structural elements in contact with the ground shall not absorb or transmit moisture in quantities that could cause damage to building elements.

902.3.3 Concealed spaces and cavities.

Concealed spaces and cavities in buildings shall be constructed in a way that prevents external moisture from causing degradation of building elements.

902.3.4 Moisture during construction.

Excess moisture present at the completion of construction shall be capable of being dissipated without permanent damage to building elements.

SECTION 903 INTERNAL MOISTURE

903.1 Objective.

To safeguard people against illness or injury that could result from accumulation of internal moisture, and to protect an occupancy from damage caused by free water from another occupancy in the same building.

903.2 Functional statement.

Buildings shall be constructed to avoid the likelihood of:

1. Fungal growths or the accumulation of contaminants on linings and other building elements.
2. Free water overflow penetrating to an adjoining occupancy.
3. Damage to building elements being caused by the use of water.

903.3 Performance requirements.

903.3.1 Excess moisture removal and protection.

An adequate means shall be provided to remove excess moisture or protect the structure from the effects of excess moisture and condensation to all habitable spaces, bathrooms, laundries and other locations where moisture may be generated.

903.3.2 Overflow.

Accidental overflow from sanitary fixtures or laundering facilities shall be constrained from penetrating another occupancy in the same building.

903.3.3 Floor surfaces.

Floor surfaces of any space containing sanitary

fixtures or laundering facilities shall be impervious to water and easily cleaned.

903.3.4 Wall surfaces.

Wall surfaces adjacent to sanitary fixtures or laundering facilities shall be impervious to water and easily cleaned.

903.3.5 Surfaces and building elements.

Surfaces of building elements likely to be splashed or to become contaminated in the course of the intended use of the building shall be impervious to water and easily cleaned.

903.3.6 Water splash.

Water splash shall be prevented from penetrating behind linings or into concealed spaces.

CHAPTER 10 – INTERIOR ENVIRONMENT

SECTION 1001 CLIMATE AND BUILDING FUNCTIONALITY

1001.1 Objective.

To safeguard people from illness caused by air temperature and to safeguard people from injury or loss of amenity caused by inadequate activity space.

1001.2 Functional statements.

Buildings shall be constructed to provide:

1. Adequately controlled interior temperatures.
2. Adequate activity space for the intended use.

1001.3 Performance requirements.

1001.3.1 Temperature.

Habitable spaces, bathrooms and recreation rooms shall be designed to maintain the internal temperature at a level sufficient for the occupants while the space is adequately ventilated.

1001.3.2 Space.

Habitable spaces shall have sufficient space for activity, furniture and sanitary needs of the occupants.

SECTION 1002 INDOOR AIR QUALITY

1002.1 Objective.

To maintain the habitable spaces of buildings and facilities with an environment that is conducive to the comfort, health and safety of the occupants.

1002.2 Functional statement.

Habitable spaces within buildings shall be provided with air that contains sufficient oxygen and limits the levels of moisture and contaminants to levels that are consistent with good health, safety and comfort.

1002.3 Performance requirements.

1002.3.1 Ventilation.

Habitable spaces within buildings shall have means of ventilation that maintains air quality at all times that the spaces are occupied and with the maximum number of occupants anticipated.

1002.3.2 Collection and removal.

Buildings shall have a means of collecting or otherwise removing the following products from the spaces in which they are generated:

1. Cooking fumes and odors.

2. Excessive water vapor from laundering, utensil washing, bathing and showering.
3. Odors from sanitary and waste storage spaces.
4. Gaseous byproducts and excessive moisture from commercial or industrial processes.
5. Poisonous fumes and gases.
6. Air-borne particles.
7. Products of combustion.
8. Off-gases from building materials, fixtures and contents.

1002.3.3 Building materials.

Building materials that release quantities of contaminants that cannot be maintained at safe levels shall not be used.

1002.3.4 Contaminated air.

Contaminated air shall be disposed of in a way that avoids creating a nuisance or hazard to people and other property.

1002.3.5 Sufficient supply air.

The quantity of air supplied for ventilation shall account for the demands of any fixed combustion appliances.

SECTION 1003 AIR-BORNE AND IMPACT SOUND

1003.1 Objective.

To safeguard people from loss of amenity as a result of excessive noise being transmitted between adjacent tenants or occupancies.

1003.2 Functional statement.

Building elements that are common between tenants or occupancies shall be constructed to prevent excessive noise transmission from other tenants or occupancies or common spaces to habitable spaces.

1003.3 Performance requirements.

1003.3.1 Tenant separations.

The air-borne transmission of sound through tenant separation walls and floors shall be reduced to a level that minimizes its effect on adjacent occupants.

1003.3.2 Floors.

The structure-borne transmission of sound through floors shall be reduced to a level that minimizes its effect on adjacent occupants.

SECTION 1004 ARTIFICIAL AND NATURAL LIGHT

1004.1 Objective.

To safeguard people from injury or loss of amenity due to lack of adequate lighting.

1004.2 Functional statements.

1004.2.1 Lighting for safe movement.

Habitable spaces and means of egress within buildings shall be provided with adequate artificial lighting to enable safe movement.

1004.2.2 General lighting.

Adequate natural or artificial light shall be provided in all habitable spaces.

1004.3 Performance requirements.

1004.3.1 Illumination.

Adequate illumination shall be provided appropriate to the use and occupancy of the habitable spaces and means of egress served.

1004.3.2 Natural light.

Natural light shall provide a luminance appropriate to the use and occupancy of the habitable spaces served.

CHAPTER 11 – MECHANICAL

SECTION 1101 HEATING, VENTILATION AND AIR CONDITIONING EQUIPMENT (HVAC)

1101.1 Objective.

To provide the safe installation of the equipment to condition the air for the health and comfort of the occupants.

1101.2 Functional statement.

The installation of equipment shall safeguard maintenance personnel and building occupants from injury and deliver air at the appropriate temperature for health and comfort.

1101.3 Performance requirements.

1101.3.1 Protection from equipment.

People and building elements shall be protected from contact with hot and live electrical parts.

1101.3.2 Service and replacement ability.

The HVAC system shall allow safe isolation and access for service and replacement of equipment.

1101.3.3 Temperature controls.

The HVAC system shall include devices to monitor and control the temperature.

1101.3.4 Securing of equipment.

HVAC equipment and appliances shall be secured in place.

SECTION 1102 REFRIGERATION

1102.1 Objective.

To provide the safe installation and operation of refrigeration equipment.

1102.2 Functional statement.

The installation of equipment shall safeguard maintenance personnel and building occupants from injury.

1102.3 Performance requirements.

1102.3.1 Protection from equipment.

People and building elements shall be protected from contact with hot or live electrical parts.

1102.3.2 Service and replacement ability.

Refrigeration equipment shall allow safe isolation and access for service and replacement of equipment.

1102.3.3 Temperature controls.

Refrigeration equipment shall include devices to monitor and control temperature.

1102.3.4 Toxic and flammable refrigerants.

Refrigeration equipment shall have appropriate safeguards when utilizing toxic or flammable refrigeration agents.

SECTION 1103 PIPED SERVICES

1103.1 Objective.

To safeguard people from injury or illness caused by extreme temperatures or hazardous substances associated with building services.

1103.2 Functional statement.

In buildings with potentially hazardous services containing hot, cold, flammable, corrosive or toxic liquids or gases, the installations shall be constructed to provide adequate safety for people.

1103.3 Performance requirements.

1103.3.1 Construction.

Piping systems shall be constructed to avoid the likelihood of:

1. Significant leakage or damage during normal or reasonably foreseeable abnormal conditions.
2. Detrimental contamination of the contents by other substances.
3. Adverse interaction between services or between piping and electrical systems.
4. People having contact with pipes that could cause them harm.

1103.3.2 Corrosion.

Pipes shall be protected against corrosion in the environment of their use.

1103.3.3 Identification.

Piping systems shall be identified with markings if the contents are not readily apparent from the location or associated equipment.

1103.3.4 Enclosed spaces.

Enclosed spaces shall be constructed to avoid the

likelihood of accumulating vented or leaking flammable gas.

1103.3.5 Isolation.

A piped system shall have isolation devices that

permit the complete system or components of the system to be isolated from the supply system for maintenance, testing, fault detection and repair.

CHAPTER 12 – PLUMBING

SECTION 1201 PERSONAL HYGIENE

1201.1 Objective.

To provide facilities with appropriate space, fixtures and equipment for personal hygiene.

1201.2 Functional statement.

To provide adequate plumbing fixtures that reasonably protect people from illness and provide reasonable access to such fixtures conducive to health, safety and comfort of the occupants.

1201.3 Performance requirements.

1201.3.1 Number of plumbing fixtures.

Plumbing fixtures shall be provided in sufficient numbers appropriate for the intended use.

1201.3.2 Privacy.

Plumbing fixtures shall be located to provide appropriate privacy.

1201.3.3 Cleanliness.

Plumbing fixtures shall be constructed to avoid food contamination and accumulation of dirt or bacteria, and permit effective cleaning.

1201.3.4 Wastewater removal.

Plumbing fixtures shall be installed to discharge to drainage systems without contaminating food.

1201.3.5 Location of plumbing fixtures.

Facilities for personal hygiene shall be provided in convenient locations and spaces of appropriate size to permit the use of the fixtures.

SECTION 1202 LAUNDERING

1202.1 Objective.

To provide adequate facilities for laundry.

1202.2 Functional statement.

Laundry facilities shall be provided for use by occupants of dwelling units.

1202.3 Performance requirement.

Space shall be adequate in size for the required fixtures and equipment.

SECTION 1203 DOMESTIC WATER SUPPLIES

1203.1 Objective.

To provide sanitary distribution of water for drinking, food preparation and hygiene.

1203.2 Functional statement.

Sanitary water shall be delivered to fixtures, appliances and equipment at temperatures appropriate for the intended use.

1203.3 Performance requirements.

1203.3.1 Potable water.

Water supplies intended for human consumption, oral hygiene, food preparation and the washing of cooking equipment shall be potable.

1203.3.2 Nonpotable water.

Water supplies and outlets providing nonpotable water shall be clearly identified.

1203.3.3 Hot water.

Plumbing fixtures and appliances used for personal hygiene, laundering and the washing of cooking equipment shall be provided with hot water.

1203.3.4 Scalding.

Where hot water is provided for personal hygiene, it shall be delivered at a temperature to avoid scalding.

1203.3.5 Water supply contamination.

Water supplies shall be installed to avoid potable water contamination.

1203.3.6 Flow rate and pressure.

Water supplies shall be provided to plumbing fixtures, appliances and equipment at a flow rate and pressure adequate for their operation.

1203.3.7 Leak prevention.

Water piping shall be installed in a leak-free manner.

1203.3.8 Access.

Water systems shall be installed to allow adequate access for maintenance.

1203.3.9 Water piping isolation and protection from contamination.

Water piping shall be installed with provisions for adequate isolation of the system and branches and to provide protection from contamination.

1203.3.10 Hot water vessels.

Vessels used for producing hot water shall be provided with safety devices to relieve excessive pressure and limit temperatures.

SECTION 1204 WASTEWATER**1204.1 Objective.**

To provide safe drainage and disposal systems for wastewater from plumbing fixtures, appliances and equipment.

1204.2 Functional statement.

The drainage system shall conduct wastewater to an appropriate disposal point, protect people from contamination and unpleasant odor, and avoid blockages.

1204.3 Performance requirements.**1204.3.1 Prevention of blockage and leakage.**

The drainage system shall conduct wastewater from all plumbing fixtures, appliances and equipment, avoiding the likelihood of blockage and leakage.

1204.3.2 Sewer gases.

The drainage system shall be designed and installed to prevent sewer gases from entering the building.

1204.3.3 Accessibility.

The drainage system shall be accessible for maintenance and clearing of blockages.

1204.3.4 Sewer connection.

The drainage system shall be connected to the sewer in a manner acceptable to the operator of the sewer system.

1204.3.5 On-site sewage disposal.

On-site sewage disposal systems shall be designed and installed in an approved manner.

CHAPTER 13 – FUEL GAS

operated at a safe pressure appropriate to the appliances served by the system.

SECTION 1301 FUEL GAS PIPING AND VENTS

1301.1 Objective.

To ensure that fuel gas is distributed and utilized in a safe manner.

1301.2 Functional statement.

In buildings where fuel gas is used as an energy source, the gas piping vented and unvented systems shall be safe and adequate for their intended use.

1301.3 Performance requirements.

1301.3.1 General.

Gas piping systems shall be free of leaks and

1301.3.2 Isolation.

Gas piping systems shall have isolation devices that permit isolation of appliances, or isolation of the gas piping systems from the supply, for maintenance, testing, leak detection or repair.

1301.3.3 Conveyance of products of combustion.

Vented gas appliances shall convey products of combustion directly to the exterior without affecting the operation of other gas vents.

1301.3.4 Safety controls.

Vented gas appliances shall be provided with safety controls that prevent their operation in the event of failure of forced ventilation systems or natural draft systems.

CHAPTER 14 – ELECTRICITY

SECTION 1401 ELECTRICITY

1401.1 Objective.

To provide safe installation of electrical power and lighting for the building systems and use by the building occupants.

1401.2 Functional statement.

The electrical installations shall have safeguards against personal injury and the outbreak of fire.

1401.3 Performance requirements.

1401.3.1 Protection from live parts.

People and building elements shall be protected against contact with live parts.

1401.3.2 Isolation.

The electrical installation shall allow safe isolation of devices, equipment and appliances.

1401.3.3 Protection from excessive current.

People shall be protected from the effects of current exceeding the rating of the installation.

1401.3.4 Electromechanical stress.

The installation shall protect all components and

equipment from electromechanical stress caused by current exceeding its rating.

1401.3.5 Thermal damage.

Building elements shall be protected from thermal damage due to heat transfer or electric arc from electrical power installations.

1401.3.6 Installation environment.

The installation shall operate safely in the intended environment.

1401.3.7 Flammable and explosive atmosphere.

The installation shall prevent ignition of the atmosphere containing flammable or explosive elements.

1401.3.8 Essential services and equipment.

Essential services and equipment shall have a power supply protected in a manner to ensure continued operation for an appropriate time after a power failure.

1401.3.9 Power supplier.

The building electrical installation shall protect the safety features of the power supplier.

CHAPTER 15 – ENERGY EFFICIENCY

SECTION 1501 ENERGY EFFICIENCY

1501.1 Objective.

To facilitate efficient use of energy.

1501.2 Functional statement.

Buildings shall have provisions ensuring efficient use of nonrenewable energy.

1501.3 Performance requirements.

1501.3.1 Energy performance indices.

To provide for the efficient use of depletable energy sources, the building envelope shall be designed and constructed within stated parameters. These parameters are called the energy performance indices. These indices are the amount of energy from a depletable energy source passing through a specified

building envelope area during a specified difference in internal and external temperature. These indices are based on the region of the country as well as the use of the building. Equivalent energy performance utilizing alternative energy conservation techniques is permitted. In some cases, for certain types of buildings, the local jurisdiction has the authority to choose not to specify energy performance indices.

1501.3.2 Temperature control.

For buildings requiring a controlled temperature, the building design and construction shall take into account various factors. Normally, only insulation, types of windows and related building elements are considered when addressing energy conservation. However, to provide for the efficient use of energy, there are several other items that need to be taken into consideration, such as thermal resistance, solar radiation, air tightness and heat gain or loss from building services.

CHAPTER 16 – FIRE PROTECTION

SECTION 1601 FIRE PREVENTION

1601.1 Objective.

To limit or control the likelihood that a fire will start because of the design, operation or maintenance of a facility or its systems so as to minimize impacts on people, property, processes and the environment.

1601.2 Functional statement.

Facility services, systems and activities that represent a potential source of ignition or can contribute fuel to an incipient fire shall be designed, operated, managed and maintained to reduce the likelihood of a fire starting.

1601.3 Performance requirements.

1601.3.1 Ignition sources.

Electrical, mechanical and chemical systems or processes and facility services capable of supplying sufficient heat under normal operating conditions or

anticipated failure modes to ignite combustible system components, facility elements or nearby materials shall be designed, operated, managed and maintained to prevent the occurrence of fire.

1601.3.2 Fuel sources.

The quantities, configurations, characteristics or locations of combustible materials, including components or facility systems, facility elements, facility contents and accumulations of readily ignitable waste or debris shall be managed or maintained to prevent ignition by facility service equipment and other ignition sources associated with processes normally present or expected to be present within the facility.

1601.3.3 Ignition and fuel source interactions.

Design, operate and maintain facility services and facility system installation locations to prevent the occurrence or to control the extent of atmospheres likely to pose an ignition hazard.

CHAPTER 17 – FIRE IMPACT MANAGEMENT

SECTION 1701 FIRE IMPACT MANAGEMENT

1701.1 Objective.

To provide an acceptable level of fire safety performance when facilities are subjected to fires that could occur in the fire loads that may be present in the facility during construction or alteration and throughout the intended life.

1701.2 Functional statements.

Facilities shall be designed with safeguards against the spread of fire so that no person not directly adjacent to or involved in the ignition of a fire shall suffer serious injury or death from a fire, and so that the magnitude of the property loss is limited as follows:

Performance Group I—High
Performance Group II—Moderate
Performance Group III—Mild
Performance Group IV—Mild

1701.2.1 Fire potential.

Facilities and contents shall be maintained in a manner that limits the potential for fire.

1701.2.2 Fire impact.

Facilities shall be designed, constructed and maintained to limit the fire impact to people and property.

1701.2.3 Time for evacuation.

Facilities shall be designed, constructed, maintained and operated with appropriate safeguards in place to limit the spread of fire and products of combustion so that occupants have sufficient time to escape the fire.

1701.2.4 Limitation on fire spread.

Facilities shall be designed, constructed, maintained and operated in such a manner that the spread of fire through a building is restricted, and that fire does not spread to adjacent properties.

1701.2.5 Wildland fires.

In wildland interface areas, facilities and vegetation shall be designed, constructed, arranged and maintained in such a manner to limit the impact to the building and the facilities during a wildland fire event.

1701.2.6 Emergency responder needs.

Facilities shall be arranged, constructed, maintained

and operated with appropriate safeguards in place to allow fire-fighting personnel to perform rescue operations and to protect property.

1701.2.7 Structural integrity.

Facilities shall be arranged, constructed and maintained so as to limit the impact of a fire on the structural integrity of the facility.

1701.2.8 Capability of building or facility users.

All facilities open to persons of varying physical and mental capabilities shall provide reasonably equivalent levels of fire safety protection for those persons to the levels it provides for persons without disabilities.

1701.3 Performance requirements.

Facilities or portions thereof shall be designed, constructed and operated to normally prevent any fire from growing to a stage that would cause life loss or serious injury, taking into account all anticipated and permitted fire loads that would affect their performance. Facilities shall be designed to sustain local fire damage, and the facility as a whole will remain intact and not be damaged to an extent disproportionate to the original local damage.

1701.3.1 Interior surface finishes.

Interior surface finishes on walls, floors, ceilings and suspended building elements shall resist the spread of fire and limit the generation of unacceptable levels of toxic gases, smoke and heat appropriate to the design performance level and associated hazards, risks and fire safety systems or features installed.

1701.3.2 Building materials, processes and contents.

Limit quantities, configurations and combustibility of building materials, processes and contents so that fire growth and size can be controlled.

1701.3.3 Emergency responders.

Where necessary, provide appropriate measures to limit fire and smoke spread and damage to acceptable levels so that fire fighters are not unduly hindered in suppression or rescue operations.

1701.3.4 Detection and notification.

Where human intervention or system or equipment response is necessary to limit the fire impact, provide appropriate means for detection and notification of fire.

1701.3.5 Activation of detection systems.

Fire detection systems, when provided, shall activate at a fire size appropriate to the fire and life safety strategies selected.

1701.3.6 Activation of suppression systems.

Automatic fire suppression systems, when provided as a means of controlling fire growth or to suppress the fire, shall deliver sufficient suppression agent to control or suppress the fire as appropriate.

1701.3.7 Control of smoke.

Smoke control systems, when provided, shall limit the unacceptable spread of smoke to nonfire areas as appropriate.

1701.3.8 Concealed spaces.

Construction in concealed spaces shall inhibit the unseen spread of fire and unacceptable movement of hot gases and smoke, appropriate to associated hazards, risks and fire safety systems or features installed.

1701.3.9 Vertical openings.

Vertical openings shall be constructed, arranged, limited or protected to limit fire and smoke spread as appropriate to the fire and life-safety strategies selected.

1701.3.10 Wall, floor, roof and ceiling assemblies.

Wall, floor, roof and ceiling assemblies forming compartments including their associated openings shall limit the spread of fire appropriate to the associated hazards, risks and fire-safety systems or features installed.

1701.3.11 Structural members and assemblies.

Structural members and assemblies shall have a fire resistance appropriate to their function, the fire load, the predicted fire intensity and duration, the fire hazard, the height and use of the building, the proximity to other properties or structures, and any fire protection features.

1701.3.12 Exterior wall and roof assemblies' restriction of fire spread.

Construction of exterior wall and roof assemblies shall restrict the spread of fire to or from adjacent buildings and from exterior fire sources, appropriate to the associated hazards, risks and fire safety systems or features installed.

1701.3.13 Exterior wall and roof assemblies' contribution to fire growth.

Construction of exterior wall and roof assemblies shall resist the spread of fire by limiting their

contribution to fire growth and development, appropriate to the associated hazards, risks and fire safety systems or features installed.

1701.3.14 Air handling and mechanical ventilation systems.

Air handling and mechanical ventilation systems, when provided, shall be designed to avoid or limit the unacceptable spread of fire and smoke to nonfire areas as appropriate.

1701.3.15 Magnitude of fire event.

Design fire events shall realistically reflect the ignition, growth and spread potential of fires and fire effluents that could occur in the fire load that may be present in the facility by its design and operational controls.

1701.3.15.1 Design fire events.

Magnitudes of design fire events shall be described in terms of the potential spread of fire and fire effluents given the proposed design, arrangement, construction, furnishing and use of a building.

1701.3.15.2 Range of fire sizes.

Magnitudes of design fire events shall be defined as small, medium, large and very large, based on the quantification of the design fire event as a function of the building use and associated performance group.

1701.3.15.3 Engineering analyses of potential fire scenarios.

Quantification of the magnitudes of design fire events shall be based on engineering analyses of potential fire scenarios that can be expected to impact a building through its intended life. For each design fire scenario considered, the analyses shall include the ignitability of the first item, the peak heat release rate of the item first ignited, the rate of heat release and expected fire growth, and the overall fuel load, geometry, and ventilation of the space and adjoining spaces.

1701.3.15.3.1 Relationship of design fire to tolerable damage.

When determining (assigning) the magnitude of a design fire event, the physical properties of the fire and its effluents shall only be considered in terms of how they impact the levels of tolerable damage. The magnitude of the fire event is not required to be characterized solely on the basis of the physical size of the fire in terms of its heat release and smoke production rates.

1701.3.15.3.2 Design parameters.

Multiple design fire scenarios, ranging from small to

very large design fire events, shall be considered to ensure that associated levels of tolerable damage are not exceeded as appropriate to the performance group.

1701.3.15.3.3 Factors in determining design fire scenarios.

The development of design fire scenarios shall consider the use of the room of fire origin and adjoining spaces, in terms of impact on occupant, property and community welfare.

1701.3.15.3.4 Justification.

Justification of the magnitudes of design fire events and design fire scenarios shall be part of the analysis prepared by the design professional and shall take into consideration the reasonableness, frequency and

severity of the design fire event and design fire scenarios.

1701.3.15.3.5 Safety factors.

Design fires and fire scenarios shall be chosen to provide appropriate factors of safety to provide adequate performance by accounting for the following factors:

1. Effects of uncertainties arising from construction activities.
2. Variations in the properties of materials and the characteristics of the site.
3. Accuracy limitations inherent in the methods used to predict the fire safety of the building.
4. Variations in the conditions of facilities, systems, contents and occupants.

CHAPTER 18 – MANAGEMENT OF PEOPLE

SECTION 1801 MANAGEMENT OF PEOPLE

1801.1 Objective.

To promote safe practices and actions of people, and to assure that the actions and practices of people that are components of a design are maintained.

1801.2 Functional statements.

1801.2.1 Training and education for prevention of fires and other emergencies.

Through training and education, ensure that people possess the necessary skills and implement the appropriate actions to prevent fires or other emergencies as appropriate to the design performance level determined in Chapter 3.

1801.2.2 Training and education for mitigation of fires and other emergencies.

Through training and education, ensure that people possess the necessary skills and implement the appropriate actions during a fire or other emergency as appropriate to the design performance level determined in Chapter 3.

1801.3 Performance requirements.

1801.3.1 Identification of hazards.

Provide appropriate information so that occupants and staff can assist in identifying hazards.

1801.3.2 Procedure development and training for fire or other emergency.

Develop procedures and conduct training so that occupants and staff can take appropriate actions to prevent fires or other emergencies.

1801.3.3 Actions during fires or other emergencies.

Provide adequate information so that occupants and staff know the appropriate actions in the event of a fire or other emergency.

1801.3.4 Procedure development and training for mitigation.

Develop procedures and conduct training so that occupants and staff can take the appropriate actions in the event of a fire or other emergency.

1801.3.5 Proper handling and use of hazardous materials.

Provide adequate information so that all persons

involved in the handling and use of hazardous materials know the appropriate actions and safeguards for such materials.

1801.3.6 Hazardous materials emergency training.

Develop procedures so that all persons involved in the handling and use of hazardous materials will take the appropriate actions in the event of an emergency.

1801.3.7 Management of procedures and training.

Provide the administrative controls to assure that the identified hazards are controlled, procedures are followed and training occurs.

1801.3.8 Validation of policies, procedures and training.

Provide the administrative controls to evaluate and validate all policies, procedures and training for occupants and staff.

1801.3.9 Management of change.

Whenever new occupants, staff, equipment, materials or processes are introduced, the administrative controls shall provide for appropriate education and training.

1801.3.10 Documentation of reliance on occupants and staff.

Ensure that all aspects of a performance-based design that rely on a response or action from either occupants or staff are clearly identified and documented and that the necessary training and administrative controls are in place and maintained so that the response or action is appropriate.

CHAPTER 19 – MEANS OF EGRESS

Means of egress shall enable reasonable use by the occupants in the building with due regard to human biomechanics and expectation of consistency.

SECTION 1901 MEANS OF EGRESS

1901.1 Objective.

To protect people during egress and rescue operations.

1901.2 Functional statement.

Enable occupants to exit the building, facility and premises or reach a safe place as appropriate to the design performance level determined in Chapter 3.

1901.3 Performance requirements.

1901.3.1 General.

The construction, arrangement and number of means of egress, exits and safe places for buildings shall be appropriate to the travel distance, number of occupants, occupant characteristics, building height, and safety systems and features.

1901.3.2 Identification, illumination and safety of means of egress.

Means of egress shall be clearly identified, provided with adequate illumination and be easy and safe to use.

1901.3.3 Unobstructed path.

Means of egress shall provide an unobstructed path of travel from each safe place to not less than one exit.

1901.3.4 Protection from untenable conditions.

Each safe place shall provide adequate protection from untenable conditions, an appropriate communication system, and adequate space for the intended occupants.

1901.3.5 Human biomechanics and expectation of consistency.

1901.3.6 Maintenance of means-of-egress systems.

Suitable means of egress shall be provided in satisfactory arrangement throughout all buildings, facilities and premises, regardless of when they were constructed, based upon the number and character of occupants, length of travel, provision of existing alternative paths, timeline of emergency detection

and response, risk level, time to exit and safety systems provided.

1901.3.7 Maintenance of clear path.

Means of egress shall be maintained without obstructions or reductions in capacity that would hinder the ability of the occupants to egress safely.

1901.3.8 Interference with identification of exits.

Means of egress shall be readily identifiable. Buildings shall be operated and maintained in a manner that does not interfere with the identification of exits.

1901.3.9 Ease of use.

Means of egress shall be maintained and operated in such a manner to ensure that all egress facilities are readily openable and available without special knowledge or effort consistent with the use or occupancy characteristics.

1901.3.10 Maintenance of illumination.

Means of egress shall be maintained and operated in such a manner to ensure that adequate lighting to facilitate safe egress is available.

CHAPTER 20 – EMERGENCY NOTIFICATION, ACCESS, AND FACILITIES

SECTION 2001 EMERGENCY NOTIFICATION, ACCESS AND FACILITIES

2001.1 Objectives.

2001.1.1 Notification, access and facilities for emergency responders.

To provide and maintain means of notification, access and facilities for emergency operations and responders.

2001.1.2 Notification for life safety and property protection.

To provide notification of the need to take some manual action to preserve the safety of occupants or to limit property damage.

2001.2 Functional statements.

As appropriate to the design performance level in Chapter 3, the following shall be addressed:

1. Provide and maintain appropriate access for emergency vehicles.
2. Provide and maintain appropriate access for emergency responders.
3. Provide and maintain necessary staging, command and control areas, support facilities and equipment for emergency operations.
4. Provide sufficient, reliable water for fire-fighting operations.
5. Provide and maintain appropriate means of promptly notifying emergency responders.
6. Where required, provide and maintain adequate means of occupant notification to warn of the presence of a fire or other emergency in sufficient time to enable occupants to take the contemplated action without being exposed to unreasonable risk of injury or death.

2001.3 Performance requirements.

2001.3.1 Vertical and horizontal clearance for fire department apparatus.

Vertical and horizontal clearance shall permit the unimpeded access of fire department apparatus inclusive of the capability for one apparatus to pass another apparatus set up and in operation.

2001.3.2 Protrusions and appurtenances from structures.

Protrusions and appurtenances from structures shall not impede access, including vertical access, to the height of fire department aerial apparatus.

2001.3.3 Surfaces for fire department apparatus.

Fire department access shall be on surfaces permitting year-round, all-weather travel at a grade appropriate for the fire apparatus.

2001.3.4 Hose length limitations.

Access to structures shall afford the fire department the ability to deploy and operate hose lines without the need to extend the standard hose line utilized by the fire department having jurisdiction.

2001.3.5 Control valve locations.

Within structures, means for the deployment and operation of hose lines by emergency responders shall be provided such that control valves for lines shall be no further from potential fire sources than the length of hose packs employed by a single engine company of the fire department having jurisdiction.

2001.3.6 Water supply.

Water supply for fire department operations shall be from a reliable, readily accessible source acceptable to the fire department and capable of supporting fire-fighting operations.

2001.3.7 Horizontal or vertical conveyance.

Means of horizontal or vertical conveyance shall be provided where necessary to support fire-fighting and emergency support functions.

2001.3.8 Staging areas.

Where interior operations may be necessary, areas to stage equipment and from which to safely conduct and to control suppression operations shall be provided.

2001.3.9 Interaction of access and means of egress.

Exterior and interior egress and emergency access shall be arranged and maintained so that building occupants and emergency responders are unimpeded as each accomplishes its objectives of egress of occupants and access by emergency responders.

2001.3.10 Interior and exterior staging.

When necessary to ensure timely and effective emergency operations, interior or exterior areas shall be provided for the staging of equipment and apparatus.

2001.3.11 On-site equipment.

When necessary to ensure timely and effective emergency operations, fire-fighting equipment or other equipment to support such operations shall be provided and maintained readily available for use by emergency responders.

2001.3.12 Notification requirements.

Where systems are designed to notify the emergency-

response agency of the need to respond to an emergency, such system shall indicate the type of emergency and the location of the building, premises or facility. Where such buildings, premises or facilities are large enough that difficulty is expected in promptly locating the emergency, identification of the area or zone of the emergency shall be provided at the building, premises or facilities.

2001.3.13 Notification of occupants.

Notification of occupants shall be by means appropriate to the needs of the occupants, the use of the building and the emergency egress strategy employed.

CHAPTER 21 – EMERGENCY RESPONDER SAFETY

SECTION 2101 EMERGENCY RESPONDER SAFETY

2101.1 Objective.

To protect emergency responders from unreasonable risks during emergencies.

2101.2 Functional statements.

As appropriate to the design performance level determined in Chapter 3:

1. Provide information to responders regarding hazards present at the building or premises;
2. Protect against unanticipated structural collapse; and
3. Provide appropriate fire service communications capability.

2101.3 Performance requirements.

2101.3.1 Identification of hazards.

When hazards are present in the building, facility or premises that could endanger emergency responders beyond what would normally be anticipated, means shall be provided to alert the responders to the hazards.

2101.3.2 Signage.

Signage shall be provided as needed to identify special hazards to the emergency responders (and to the degree applicable, the nature of the hazard).

2101.3.3 Collapse.

Buildings and structures shall be designed, constructed, loaded and maintained so that the potential for structural collapse is predictable based on the construction method, building condition and fire size, location and duration.

2101.3.4 Communication systems.

Communication systems for use by the emergency responders must be provided when the size, construction or complexity of the building may cause the emergency responders' communication methods to be ineffective or unreliable.

CHAPTER 22 – HAZARDOUS MATERIALS

the risk of exposing combustible hazardous materials to unintended sources of ignition.

SECTION 2201 HAZARDOUS MATERIALS

2201.1 Objective.

To protect people and property from the consequences of unauthorized discharge, fires or explosions involving hazardous materials.

2201.2 Functional statements.

2201.2.1 Prevention.

Provide adequate safeguards to minimize the risk of unwanted releases, fires or explosions involving hazardous materials as appropriate to the design performance level determined in Chapter 3.

2201.2.2 Mitigation.

Provide adequate safeguards to minimize the consequences of an unsafe condition involving hazardous materials during normal operations and in the event of an abnormal condition in accordance with the design performance level determined in Chapter 3.

2201.3 Performance requirements.

2201.3.1 Properties of hazardous materials.

The properties of hazardous materials on site shall be known and shall be available to employees, neighbors and code-enforcement officials.

2201.3.2 Reliability of equipment and operations.

Equipment and operations involving hazardous materials shall be designed, installed and maintained to ensure that they reliably operate as intended.

2201.3.3 Prevention of unintentional reaction or release.

Adequate safeguards shall be provided to minimize the risk of an unintentional reaction or release that could endanger people or property.

2201.3.4 Spill mitigation.

Spill containment systems or means to render a spill harmless to people or property shall be provided where a spill is determined to be a plausible event and where such an event would endanger people or property not in the immediate area of the spill.

2201.3.5 Ignition hazards.

Adequate safeguards shall be provided to minimize

2201.3.6 Protection of hazardous materials.

Adequate safeguards shall be provided to minimize the risk of exposing hazardous materials to a fire or physical damage whereby such exposure could endanger or lead to the endangerment of people or property.

2201.3.7 Exposure hazards.

Adequate safeguards shall be provided to minimize the risk of and limit damage from a fire or explosion involving explosive hazardous materials whereby such fire or explosion could endanger or lead to the endangerment of people or property.

2201.3.8 Detection of gas or vapor release.

Where a release of hazardous materials gas or vapor would cause immediate harm to persons or property and where such materials would not be detectable at the danger threshold by sight or smell, an adequate means of detecting, diluting or otherwise mitigating the dangerous effects of a release shall be provided.

2201.3.9 Reliable power source.

Where a power supply is relied upon to prevent or control an emergency condition that could endanger people or property, the power supply shall be from a reliable source.

2201.3.10 Ventilation.

Where ventilation is necessary to limit the risk of creating an emergency condition resulting from normal or abnormal operations, an adequate means of ventilation shall be provided.

2201.3.11 Process hazard analyses.

Process hazard analyses shall be conducted as necessary to reasonably ensure protection of people and property from dangerous conditions involving hazardous materials.

2201.3.12 Written procedures and enforcement for prestartup safety review.

Written documentation of prestartup safety review procedures shall be developed and enforced to ensure that operations are initiated in a safe manner. The process of developing and updating such procedures shall involve participation of affected employees.

2201.3.13 Written procedures and enforcement for operation and emergency shutdown.

Written documentation of operating procedures and procedures for emergency shutdown shall be developed and enforced to ensure that operations are conducted in a safe manner. The process of developing and updating such procedures shall involve participation of affected employees.

2201.3.14 Written procedures and enforcement for management of change.

A written plan for management of change shall be developed and enforced. The process of developing and updating the plan shall involve participation of affected employees.

2201.3.15 Written procedures for action in the event of emergency.

A written emergency response plan shall be developed to ensure that proper actions are taken in the event of an emergency, and the plan shall be followed if an emergency condition occurs. The process of developing and updating the plan shall involve participation of affected employees.

2201.3.16 Written procedures for investigation and documentation of accidents.

Written procedures for investigation and documentation of accidents shall be developed, and accidents shall be investigated and documented in accordance with these procedures.

2201.3.17 Consequence analysis.

Where an accidental release of hazardous materials could endanger people or property off site, an analysis of the expected consequences of a plausible release shall be performed and utilized in the analysis and selection of active and passive hazard mitigation controls.

2201.3.18 Safety audits.

Safety audits shall be conducted on a periodic basis to verify compliance with the requirements of this chapter.

2201.3.19 Levels of impact.

Levels of impact related to injuries to persons, damage to processes, structure, contents and to the environment shall comply with the requirements of Section 304 for design performance levels.

2201.3.19.1 General.

Magnitudes of design events shall reflect the ignition, spill or release, growth and spread potential of

hazardous materials that can be reasonably expected to impact buildings and facilities as designed or constructed.

2201.3.19.2 Design hazardous materials release or reaction events.

Magnitudes of design events are described in terms of the potential effects given the proposed design, arrangement, construction, furnishing and use of a building or facility.

2201.3.19.3 Range of event sizes.

Magnitudes of design events shall be defined as small, medium, large and very large, where the quantification of the design event is a function of building or facility use and associated performance group.

2201.3.19.4 Engineering analysis of potential event scenarios.

Quantification of the magnitudes of design events shall be based on engineering analyses of potential scenarios that can be expected to impact a building or facility through its intended life. For each design scenario considered, the analyses shall include the ignitability, reactivity, spill or release potential, the peak release rate, the rate of continued release and expected incident growth, the overall quantity, the toxicity, chemical state and other specific hazards of the material and its impacts on people and property. The physical characteristics and ventilation of the space or area and adjoining spaces or areas shall also be considered.

2201.3.19.5 Design parameters.

Multiple scenarios, ranging from small to very large design events, must be considered to ensure that associated levels of tolerable damage are not exceeded as appropriate to the performance group.

2201.3.19.6 Factors in determining design events scenarios.

The use of the room or area of event and adjoining spaces, in terms of occupant risk, property protection and community welfare (importance) factors, shall be considered in the development of design scenarios.

2201.3.19.7 Justification.

Justification of the magnitudes of design events shall be part of the analysis prepared by the design professional.

APPENDIX A – RISK FACTORS OF USE AND OCCUPANCY CLASSIFICATIONS

SECTION A101 OBJECTIVE

A101.1 Objective.

To identify the primary uses of buildings, structures and portions of buildings and structures; to identify risk factors associated with these uses; and to facilitate design and construction in accordance with other provisions of this code. These preliminary assumptions must be documented and verified as valid in any particular case.

SECTION A102 FUNCTIONAL STATEMENTS

A102.1 Functional statements.

In determining the primary use and occupancy classification of a building, structure or portion of a building or structure, the following shall be considered.

A102.1.1 Functions.

The principal purpose or function of the building or structure.

A102.1.2 Risks.

The hazard-related risk(s) to the users.

1. In determining the principal purpose or function of the building or structure, the use and occupancy classifications found in the *International Building Code* shall be used.
2. In determining the hazard-related risk(s) to users of buildings and structures, the following shall be considered:
 - 2.1. The nature of the hazard, whether it is likely to originate internal or external to the structure, and how it may impact the occupants, the structure and the contents.
 - 2.2. The number of persons normally occupying, visiting, employed in or otherwise using the building, structure or portion of the building or structure.
 - 2.3. The length of time the building is normally occupied by people.
 - 2.4. Whether people normally sleep in the building.
 - 2.5. Whether the building occupants and other users are expected to be familiar with the building layout and means of egress.
 - 2.6. Whether a significant percentage of the building occupants are, or are expected to be, members of vulnerable population groups such as infants, young children, elderly persons, persons with physical disabilities, persons with mental disabilities or

persons with other conditions or impairments that could affect their ability to make decisions, egress without the physical assistance of others or tolerate adverse conditions.

2.7. Whether a significant percentage of building occupants and other users have familiar or dependent relationships.

SECTION A103 USE AND OCCUPANCY CLASSIFICATION

A103.1 General.

Buildings shall be classified in accordance with the *International Building Code* and as modified by applying the above risk considerations.

A103.1.1 Assembly.

A building, structure or portion of a building or structure in which persons gather for purposes such as civic, social or religious functions, recreation, food and drink consumption, or awaiting transportation.

Unless otherwise modified under a specific sub-use classification, occupants, visitors and employees shall be assumed to be awake, alert, predominantly able to exit without the assistance of others, and unfamiliar with the building or structure. Vulnerable populations of many types may be expected to be present; however, the buildings are normally occupied for only short periods of time. It shall be assumed that:

1. Risks of injury and health assumed by occupants and visitors during their use of the building or structure are predominantly involuntary.
2. Public expectations regarding the protection afforded those occupying, visiting or working in an assembly building, structure or portion thereof are high.

A103.1.1.1 A-1.

Assembly uses, usually with fixed seating, intended for the production and viewing of the performing arts or motion pictures.

A103.1.1.2 A-2.

Assembly uses intended for food and drink consumption. It may be assumed that some portion of the population within this use group will be consuming alcohol, that loud and distracting sounds will be present, and that flashing lights may be present under normal conditions.

A103.1.1.3 A-3.

Assembly uses intended for worship, recreation or amusement, and other assembly uses not classified elsewhere in Use Group A.

A103.1.1.4 A-4.

Assembly uses intended for viewing of indoor sporting events and activities with spectator seating. It may be assumed that some portion of the population within this use group will be consuming alcohol, that loud and distracting sounds will be present and that flashing lights may be present under normal conditions.

A103.1.1.5 A-5.

Assembly uses intended for participation in or viewing of outdoor activities. It may be assumed that some portion of the population within this use group will be consuming alcohol, that loud and distracting sounds will be present and that flashing lights may be present under normal conditions.

A103.1.2 Business.

A building, structure or portion of a building or structure for office, professional or service type transactions, including storage of records and accounts. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure.
2. Risks of injury and health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary.
3. Public expectations regarding the protection afforded those occupying, visiting or working in a business building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.3 Educational.

A building, structure or portion of a building or structure in which six or more persons, generally under the age of 18, gather for formal educational purposes. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert and familiar with the building or structure.
2. Persons under the age of 10 will require assistance in exiting, and that persons 10 years of age and older will predominantly be able to exit without assistance.
3. Risks of injury and health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary.
4. Public expectations regarding the protection afforded those occupying, visiting or working in an educational building, structure or portion thereof are high.

A103.1.4 Factory-Industrial.

A building, structure or portion of a building or structure that involves assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as hazardous. Unless otherwise modified under a specific sub-use classification, occupants, visitors and employees shall be assumed to be awake, alert, predominantly able to exit without the assistance of others, and familiar with the building or structure. It shall be assumed that:

1. Risks of injury and health assumed by occupants, visitors and employees during their use of the building or structure are predominantly voluntary.
2. Public expectations regarding the protection afforded those occupying, visiting or working in a factory-industrial building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.4.1 F-1, Moderate Hazard.

Factory-Industrial uses that are not classified as F-2, Low Hazard.

A103.1.4.2 F-2, Low Hazard.

Factory-Industrial uses that involve the fabrication or manufacturing of noncombustible materials, which during finishing, packing or processing, do not involve a significant fire hazard.

A103.1.5 Hazardous.

A building, structure or portion of a building or structure that involves the manufacturing, processing, generation or storage of corrosive, highly toxic, highly combustible, flammable or explosive materials that constitute a high fire or explosion hazard, including loose combustible fibers, dust and unstable materials. Unless otherwise modified under a specific sub-use classification, occupants, visitors and employees shall be assumed to be awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure. It shall be assumed that:

1. Risks of injury and health assumed by occupants, visitors and employees during their use of the building or structure are predominantly voluntary.
2. The occupants, visitors and employees have little control over hazards imposed on them during their use of the building or structure.
3. Public expectations regarding the protection afforded those occupying, visiting or working in a hazardous building, structure or portion thereof are high.

A103.1.5.1 H-1, Detonation Hazard.

A building or structure that contains materials that present a detonation hazard.

A103.1.5.2 H-2, Deflagration Hazard.

A building or structure that contains materials that present a deflagration hazard or a hazard of accelerated burning.

A103.1.5.3 H-3, Combustion or Physical Hazard.

A building or structure that contains significant quantities of materials that readily support combustion or that present a significant physical hazard.

A103.1.5.4 H-4, Health Hazard.

A building or structure that contains significant quantities of materials that are health hazards.

A103.1.5.5 H-5, Production Material Hazard.

A semiconductor fabrication facility or comparable research and development area in which hazardous production materials (HPM) are used and the aggregate quantity poses a significant hazard.

A103.1.6 Institutional.

A building, structure or portion of a building or structure in which persons having physical or mental limitations because of health or age are harbored for medical treatment or other care or treatment, or in which people are detained for penal or correctional purposes, or in which the liberty of the occupants is restricted. Unless otherwise modified under a specific sub-use classification, occupants and visitors shall not be assumed to be awake, alert, able to exit without the assistance of others, or be familiar with the building or structure. Employees shall be assumed to be awake, alert, predominantly able to exit without the assistance of others, and familiar with the building or structure. It shall be assumed that:

1. Risks of injury and health assumed by occupants and visitors during their use of the building or structure are predominantly involuntary.
2. Risks of injury and health assumed by employees during their use of the building or structure are predominantly voluntary.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an institutional building, structure or portion thereof are moderate to high.

A103.1.6.1 I-1.

A building, structure or portion of a building or structure housing more than 16 persons on a 24-hour basis who, because of age, mental disability or other

reasons, live in a supervised residential environment where personal care services are provided. It shall be assumed that:

1. The occupants are mostly capable of responding to an emergency situation without physical assistance from staff.
2. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are nominally moderate.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an I-1 institutional building, structure or portion thereof are high.

A103.1.6.2 I-2.

A building, structure or portion of a building or structure used for medical, surgical, psychiatric, nursing or custodial care on a 24-hour basis for more than five persons who are not capable of self-preservation. It shall be assumed that:

1. The occupants are incapable of responding to an emergency situation without physical assistance from staff.
2. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are nominally high.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an I-2 institutional building, structure or portion thereof are very high.

A103.1.6.3 I-3.

A building or structure that is inhabited by more than five persons who are under some restraint security.

A103.1.6.3.1 I-3.1.

A building in that free movement is allowed from sleeping areas and other areas where access or occupancy is permitted to the exterior via a means of egress without restraint. It shall be assumed that:

1. The occupants are mostly incapable of responding to an emergency situation without physical assistance from staff.
2. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are nominally low.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an I-3.1 institutional building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.6.3.2 I-3.2.

A building in which free movement is allowed from sleeping areas and any other occupied smoke compartment to one or more other smoke

compartments. Egress to the exterior is impeded by locked exits. It shall be assumed that:

1. The occupants are incapable of responding to an emergency situation without physical assistance from staff (i.e., door release).
2. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are nominally moderate.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an I-3.2 institutional building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.6.3.3 I-3.3.

A building in which free movement is allowed within individual smoke compartments, and where egress is impeded by remote-controlled release of means of egress from one smoke compartment to another smoke compartment. It shall be assumed that:

1. The occupants are incapable of responding to an emergency situation without physical assistance from staff (i.e., door release).
2. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are nominally moderate.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an I-3.3 institutional building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.6.3.4 I-3.4.

A building in which free movement is restricted from an occupied space. Remote-controlled release is provided to permit movement from all sleeping rooms, activity spaces and other occupied areas within the smoke compartment to other smoke compartments. It shall be assumed that:

1. The occupants are incapable of responding to an emergency situation without physical assistance from staff (i.e., door release).
2. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are nominally high.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an I-3.4 institutional building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.6.3.5 I-3.5.

Buildings in which free movement is restricted from an occupied space. Staff-controlled release is provided to permit movement from all sleeping rooms, activity spaces and other occupied areas within the smoke compartment to other smoke compartments. It shall be assumed that:

1. The occupants are incapable of responding to an emergency situation without physical assistance from staff (i.e., door release).
2. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are nominally high.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an I-3.5 institutional building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.6.4 I-4.

A building or structure occupied by persons of any age who receive custodial care for less than 24 hours by individuals other than parents or guardians, relatives by blood, marriage or adoption, and in a place other than the home of the person cared for.

A103.1.6.4.1 I-4.1, Adult-care facilities.

A facility that provides accommodation for more than five unrelated adults and provides supervision and personal care services. It shall be assumed that:

1. The occupants are mostly capable of responding to an emergency situation without physical assistance from staff.
2. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are nominally moderate.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an I-4.1 institutional building, structure or portion thereof are high.

A103.1.6.4.2 I-4.2, Child-care facilities.

A facility that provides accommodation for more than five children, 2¹/₂ years of age or less. It shall be assumed that:

1. The occupants are incapable of responding to an emergency situation without physical assistance from staff.
2. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are nominally high.
3. Public expectations regarding the protection afforded those occupying, visiting or working in an I-4.2 institutional building, structure or portion thereof are very high.

A103.1.7 Mercantile.

A building, structure or portion of a building or structure for the display and sale of merchandise that involves stocks of goods, wares or merchandise incidental to such purposes and available to the public. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the

assistance of others and familiar with the building or structure.

2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and low.

3. Public expectations regarding the protection afforded those occupying, visiting or working in a mercantile building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.8 Residential.

A building, structure or portion of a building or structure for sleeping accommodations when not classified as institutional.

A103.1.8.1 R-1, Transient.

A residential occupancy where occupants are primarily transient in nature (staying less than 30 days).

A103.1.8.1.1 R-1.1, Hotel/Motel.

It shall be assumed that:

1. Occupants and visitors are not awake, alert, able to exit without the assistance of others or familiar with the building or structure.
2. Employees are awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure.
3. Risks of injury and health assumed by occupants and visitors during their use of the building or structure are predominantly involuntary.
4. Risk of injury and risk to health assumed by employees during their use of the building or structure are predominantly voluntary and low.
5. Public expectations regarding the protection afforded those occupying, visiting or working in the R-1.1 residential building, structure or portion thereof are high.

A103.1.8.1.2 R-1.2, Boarding houses.

It shall be assumed that:

1. Occupants and visitors are not awake, alert, able to exit without the assistance of others or familiar with the building or structure.
2. Employees are awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure.
3. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are predominantly involuntary.
4. Risk of injury and risk to health assumed by employees during their use of the building or structure are predominantly voluntary and moderate.
5. Public expectations regarding the protection afforded those occupying, visiting or working in the

R-1.2 residential building, structure or portion thereof are moderate.

A103.1.8.2 R-2, Multitenant residential.

A residential occupancy where the occupants are primarily permanent in nature and that contains more than two dwelling units. It shall be assumed that:

1. Occupants and visitors are not awake, alert or able to exit without the assistance of others.
2. Occupants and visitors are familiar with the building or structure.
3. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are predominantly voluntary.
4. Public expectations regarding the protection afforded those occupying, visiting or working in the R-2 residential building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.8.3 R-3, One- and two-family residential.

A residential occupancy where the occupants are primarily permanent in nature, not classified as R-1 or R-2, and that does not contain more than two dwelling units. It shall be assumed that:

1. Occupants and visitors are not awake, alert or able to exit without the assistance of others.
2. Occupants and visitors are familiar with the building or structure.
3. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are predominantly voluntary.
4. Public expectations regarding the protection afforded those occupying, visiting or working in the R-3 residential building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.8.4 R-4, Residential care.

A residential occupancy that includes all buildings arranged for occupancy as Residential Care/Assisted Living Facilities including not more than 16 occupants excluding staff. It shall be assumed that:

1. Occupants and visitors are not awake, alert, able to exit without the assistance of others or familiar with the building or structure.
2. Employees are awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure.
3. Risk of injury and risk to health assumed by occupants and visitors during their use of the building or structure are predominantly involuntary.
4. Risk of injury and risk to health assumed by employees during their use of the building or structure are predominantly voluntary and moderate.
5. Public expectations regarding the protection afforded those occupying, visiting or working in the

R-4 residential building, structure or portion thereof are high.

A103.1.9 Special use.

A building or structure that may not be fully described or considered under the other use group classifications or for which unique or special consideration shall be given.

A103.1.9.1 SP-1, Covered mall building.

A building or structure not exceeding three floor levels in height, enclosing a number of occupancies and tenancies use groups, wherein two or more tenants have a main entrance into one or more roofed or covered common pedestrian areas shared by the tenants. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.9.2 SP-2, High-rise building.

A building or structure having occupied floors located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, which may contain any use group classification or combination of use group classifications. The assumed risk levels, hazard levels and occupant characteristics shall be appropriate to the uses present within the building, and the structural, fire protection and means-of-egress features shall be designed to accommodate the highest risk level present in the building. It shall be assumed that public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are high.

A103.1.9.3 SP-3, Atrium.

An opening through two or more floor levels of a building defined by other use groups, other than for enclosed stairways, elevators, hoistways, escalators, plumbing, electrical, air-conditioning or other equipment, that is closed at the top and not defined as a mall. Risk and hazard levels shall correspond to the use group of the building within which the atrium is located.

A103.1.9.4 SP-4, Underground building.

All building spaces having a floor level used for human occupancy more than 30 feet (9140 meters) or more than one story below the level of exit discharge. Risk and hazard levels shall correspond to the use group of the building.

A103.1.9.5 SP-5, Mechanical-access open parking garage.

A structure that is used exclusively for the parking or storage of private motor vehicles, where for natural ventilation purposes, the exterior of the structure has uniformly distributed openings of at least 20 percent of the total perimeter wall area of each tier on two or more sides; that employs parking machines, lifts, elevators or other mechanical devices for vehicles moving from and to street level; and in which public occupancy is prohibited above street level. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and unfamiliar with the building or structure.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and low.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.9.6 SP-6, Ramp-access open parking garage.

A structure that is used exclusively for the parking or storage of private motor vehicles, where for natural ventilation purposes, the exterior of the structure has uniformly distributed openings of at least 20 percent of the total perimeter wall area of each tier on two or more sides; that employs a series of interconnecting ramps between tiers permitting the movement of vehicles under their own power from and to street level. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and unfamiliar with the building or structure.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and low.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.9.7 SP-7, Enclosed parking garage.

A structure used exclusively for the parking or storage of private motor vehicles that does not meet the requirements of SP-5 or SP-6. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and unfamiliar with the building or structure.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and low.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.9.8 SP-8, Motor vehicle service station.

A facility containing storage tanks, pumps and attendant facilities for the purpose of fueling gasoline- and diesel-powered motor vehicles; and a building, structure or portion of a building or structure that is used for changing tires, oil, filters or other minor repair of motor vehicles, and for motor vehicle safety and emissions inspections. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and low.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.9.9 SP-9, Motor vehicle repair garage.

A building, structure or portion of a building or structure that is used for painting, body and fender work, engine overhauling or other major repair of motor vehicles. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and low.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such

a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.9.10 SP-10, Motion picture projection room.

A room in which ribbon-type cellulose, acetate or other safety film is utilized in conjunction with electric arc, xenon or other light-source projection equipment that, when operated, may result in the production of hazardous gases, dust or radiation. It shall be assumed that:

1. Visitors and employees are awake, alert and predominantly able to exit without the assistance of others.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and low.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.9.11 SP-11, Stages and platforms.

Spaces within buildings and structures, often raised above floor level, used for entertainment, presentations and similar purposes. It shall be assumed that:

1. Users are awake, alert and predominantly able to exit without the assistance of others.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and low.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.9.12 SP-12, Special amusement building.

A temporary, permanent or mobile building or structure that is occupied for amusement, entertainment or educational purposes and that contains a device or system that conveys passengers or provides a walkway along, around or over a course, in any direction, so arranged that means of egress are not readily apparent because of visual or audible distractions, or are intentionally confounded, or are not readily available because of the nature of the attraction or the mode of conveyance through the building or structure. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and unfamiliar with the building or structure.

2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and high.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are high.

A103.1.9.13 SP-13, Aircraft related structure.

A building, structure or portion of a building or structure used for air traffic control, aircraft storage and maintenance, or helicopter landing and fueling. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly involuntary and low.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.10 Storage.

A building, structure or portion of a building or structure for storage that is not classified as hazardous. Unless otherwise modified under a specific sub-use classification, occupants, visitors and employees shall be assumed to be awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure. It shall be assumed that:

1. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly voluntary.
2. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

A103.1.10.1 ST-1, Moderate Hazard.

A building or structure occupied for storage uses, which may contain materials that present moderate fire, explosion, corrosive, toxic or health hazards.

A103.1.10.2 ST-2, Low Hazard.

A building or structure occupied for storage uses that does not contain materials that present significant fire, explosion, corrosive, toxic or health hazards.

A103.1.11 Utility and miscellaneous.

A building, structure or portion of a building or structure that is accessory to one- and two-family residential buildings, is used to house livestock and livestock feed or is not covered by other provisions of this section. It shall be assumed that:

1. Occupants, visitors and employees are awake, alert, predominantly able to exit without the assistance of others and familiar with the building or structure.
2. Risk of injury and risk to health assumed by occupants, visitors and employees during their use of the building or structure are predominantly voluntary.
3. Public expectations regarding the protection afforded those occupying, visiting or working in such a building, structure or portion thereof are neither unusually high nor unusually low.

APPENDIX B – WORKSHEET FOR ASSIGNING SPECIFIC STRUCTURES TO PERFORMANCE GROUPS

SECTION B101 RISK FACTOR

B101.1 General.

This table may be used as a guide for determining the appropriate performance group allocation for specific structures that have unique characteristics. **SECTION B101 RISK FACTOR**

TABLE B101.1 WORKSHEET FOR ASSIGNING SPECIFIC STRUCTURES TO PERFORMANCE GROUPS

RISK FACTORS	RELATIVE LEVEL OF RISK FOR SPECIFIC STRUCTURE
Occupant Load. Maximum number of persons permitted to be in the structure or a portion of the structure.	
Duration. Maximum length of time that the structure is significantly occupied.	
Sleeping. Do people normally sleep in the building?	
Occupant Familiarity. Are occupants expected to be familiar with the building layout and means of egress?	
Occupant Vulnerability. What percentage of occupants, employees or visitors is considered to comprise members of a vulnerable population?	
Dependent Relationships. Is there a significant percentage of occupants or visitors who are expected to have relationships that may delay egress from the building?	
HAZARD FACTORS	
Nature of the Hazard. What is the nature of the hazard, and what are its impacts on the occupants, the structure and the contents?	
Internal or External Hazard. Is the hazard likely to originate internally or externally or both?	
LEVEL OF IMPORTANCE	
Population. Are large numbers of people expected to be present?	
Essential Facilities. Is the structure required for emergency response or post-disaster emergency treatment, utilities, communications or housing?	
Damage Potential. Is significant risk of widespread and/or long-term injuries, deaths or damage possible from the failure of the structure?	
Community Importance. Is the structure or its use largely responsible for economic stability or other important functions of the community?	
SPECIFIC ADJUSTMENTS	
Are the design performance levels adequate and appropriate for the specific structure?	
OVERALL RISK, HAZARD, IMPORTANCE FACTORS & PERFORMANCE GROUP ASSIGNMENT	

APPENDIX C – INDIVIDUALLY SUBSTANTIATED DESIGN METHOD

SECTION C101 GENERAL

C101.1 Scope.

This appendix is intended to assist in the application of Section 104 when a particular method is not considered a design guide or authoritative document as defined in Chapter 2.

C101.2 Criteria.

Individually substantiated design methods shall comply with one or more of the following:

1. A process to evaluate design options against the performance objectives and functional statements shall be provided.
2. A comparison, signed and sealed by the principal design professional, between the prescriptive requirements and this design method shall be provided.
3. Peer review shall be provided.
4. Reports prepared by the evaluation services shall be documented.
5. This method shall not negatively impact the remainder of the building that complies with the prescriptive codes.
6. The data substantiating the building performance as a whole shall accompany the design solution.
7. This method shall address the actual use of the building including the number of people, fuel load, awareness and mobility of the people, etc.
8. The methodology for validation of this method for the project shall be acceptable to the principal design professional and the code official.
9. This method shall be substantiated by a system-based approach using at least two acceptable scenarios to demonstrate compliance with design objectives and code provisions.

APPENDIX D – QUALIFICATION CHARACTERISTICS FOR DESIGN AND REVIEW OF PERFORMANCE-BASED DESIGNS

SECTION D101 GENERAL

D101.1 Scope.

In order for anyone to assess and verify that all of the members of a design team have the knowledge and characteristics needed to execute or review a performance-based design, the following lists are provided. This technique is designed specifically for performance-based projects and does not apply to prescriptive-based designs. It is important to understand that utilizing this technique relies heavily on the personal ethics of each individual, and a more formal declaration of education, training and experience may be requested by the code official. These characteristics explain the level of expertise necessary to form a complete design team, but they are not a requirement for every member of the team.

D101.2 Principal design professional characteristics.

Principal design professionals shall possess the following qualifications:

1. Registered architect or engineer by the state or jurisdiction.
2. Knowledge of all facets of the project and the underlying principles of the performance-based code and concepts.
3. Ability to perform in the role of point of contact and to coordinate activities between the design team members, owner and code official.
4. Ability to ensure that all elements of submittal to the code official are compatible, coordinated, logical, complete and comprehensive in documentation.

D101.3 Design professional characteristics.

Design professionals shall possess the following qualifications:

1. Knowledge of underlying principles of performance-based code and concepts.
2. Education, training and experience in performance-based engineering design.

3. Skill in risk and hazard assessment tools as a design method.

4. Ability to utilize performance-based code objectives and to demonstrate compliance through documentation of decision making and solutions.

5. High skill level in engineering disciplines needed in performance-based designs for structural, mechanical and fire protection systems.

D101.4 Special expert characteristics.

Special experts are those individuals who possess the following qualifications:

1. Individual has credentials of education and experience in an area of practice that is needed to evaluate risks and safe operations associated with design, operations and special hazards.
2. Licensing or registration is required when required by a state or jurisdiction for the function to be performed.

D101.5 Competent reviewer's characteristics.

The principal reviewer or code official is responsible to acquire competent reviewers with these characteristics and to utilize registered individuals when required by a state or jurisdiction. These characteristics are applicable to the code official's staff and/or contract reviewers. See Sections 103.3.6.2 and 103.3.6.3.

1. Knowledge of underlying principles and concepts of performance-based code provisions.
2. Education in performance-based engineering principles.
3. Competence in risk and hazard assessment tools as a design method.
4. Ability to verify design documents, meet analysis and documentation requirements, and to demonstrate that objectives are met.
5. High skill level in engineering disciplines needed in performance-based designs for structural, mechanical and fire protection systems.

APPENDIX E – USE OF COMPUTER MODELS

SECTION E101 GENERAL

E101.1 Scope.

This appendix provides guidance on the appropriate use of computer models.

SECTION E102 REQUIREMENTS

E102.1 Use and documentation.

The following are issues that shall be addressed when computer models are used in the design of a building or facility.

1. All computer modeling work is required to be conducted under the guidance of the design professional. Although states or jurisdictions may not require licensing or certification for a computer model operator (e.g., fire, structural, mechanical, energy), knowledge and experience is needed in the application of the program limits and the performance-based design objectives for compliance with performance-based code objectives.

2. Computer program data shall be submitted as part of documentation (e.g., program name, brief description, type of analysis and application program input and output units and description, and how it is to be used to support design). Statements of exact mathematical model(s) and accompanying submodel(s), if any, uncertainty, assumptions, limitations, scope of applicability and a few reproducible simple benchmark cases shall be included.

3. Background data must be submitted to substantiate why particular scenarios are rejected or accepted.

SECTION E103 RESPONSIBILITY

E103.1 Design professional.

The computer modeling approach is merely a tool for high-speed calculations that provides mathematics calculations, graphical and related results. It is the design professional's responsibility to incorporate the above data and background information required as documentation for his or her design document submittal. See Section 103 for more information on documentation.

REFERENCES

The following references are either documents referenced within the user's guide or references that may be of assistance in applying this code.

ASCE 7, Minimum Design Loads for Buildings and Other Structures (ASCE 2010)

ASME A17.1/B44 Safety Code for Elevators and Escalators (ASME, 2007)

ASME A17.7/CSA B44.7 Performance-Based Safety Code for Elevators and Escalators (ASME, 2007)

ASME 90.1 Safety Standard for Belt Manlifts (ASME, 2009)

ASME B20.1 Safety Standard for Conveyors and Related Equipment (ASME, 2009)

Building Department Administration, 3rd Edition, (ICC, 2007)

Building Fire Performance Analysis, Fitzgerald, R. (Wiley, 2004)

Building Safety Enhancement Guidebook [Council for Tall Buildings and Urban Habitats (CTBUH), 2002]

California Building Code, Section 3420, Peer Review Requirements (ICC, 2007)

Code Official's Guide to Performance-Based Design Review (ICC/SFPE, 2004)

Egress Design Solutions, A Guide to Evacuation and Crowd Management Planning, Tubbs, J. and Meacham, B. (Wiley, 2007)

Emergency Evacuation: Elevator Systems Guideline, Edward Cardinale, Charles Mattes, Carl Galio, et al. (CTBUH, Chicago 2004)

Engineering Security/Protective Design for High Risk Buildings, New York City Police Department, 2009

FEMA 273, NEHRP Guidelines for the Seismic Rehabilitation of Buildings (NEHRP, 1997)

FEMA 274, NEHRP Commentary on the Guidelines for the Seismic Rehabilitation of Buildings (NEHRP, 1997)

FEMA 302—National Earthquake Hazard Reductions Program (NEHRP) Recommended Provisions for Seismic Regulations for New Buildings and Other Structures (NEHRP, 1997)

FEMA 303—National Earthquake Hazard Reductions Program (NEHRP) Commentary on the Recommended Provisions for Seismic Regulations for New Buildings and Other Structures (NEHRP, 1997)

FEMA 450, National Earthquake Hazard Reductions Program (NEHRP) Recommended Provisions for Seismic Regulations for New Buildings and Other Structures (NEHRP, 2003)

ICC A117.1, Standard for Accessible and Usable Buildings and Facilities (ICC, 2003)

IBC—2012, International Building Code (ICC, 2012)

IECC—2012, International Energy Conservation Code (ICC, 2012)

IFC—2012, International Fire Code (ICC, 2012)

IFGC—2012, International Fuel Gas Code (ICC, 2012)

IMC—2012, International Mechanical Code (ICC, 2012)

IPC—2012, International Plumbing Code (ICC, 2012)

International Fire Engineering Guidelines (Australian Building Code Board, 2005)

National Building Information Model Standard, Version 1.0—Part 1 Overview, Principles, and Methodologies (National Institute of Building Sciences, 2007)

NFPA 30, Flammable and Combustible Liquids Code (NFPA, 2008)

NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals (NFPA, 2011)

NFPA 69, Standard on Explosion Prevention Systems (NFPA, 2008)

NFPA 70, National Electrical Code (NFPA, 2008)

NFPA 110, Standard for Emergency and Standby Power Systems (NFPA, 2010)

NFPA 497, Recommended Practice for Classification of Flammable Liquids, Gases or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas (NFPA, 2008)

NFPA 550, Guide to the Fire Safety Concepts Tree (NFPA, 2007)

Performance-Based Building Design Concepts, A Companion Document to the ICC Performance Code for Buildings and Facilities, Meacham, B. (ICC, 2004)

Performance-Based Seismic Engineering Guidelines, Part I, Strength Design Adaptation (SEAOC, Draft 1, revised May 5, 1998, Sections 3.7 - 3.10)

Process Safety Management Planning, 29 CFR Part 1910 (OSHA)

Recommended Guidelines for the Practice of Structural Engineering in California, second edition, October, 1995, Chapter 4.

Recommended Lateral Force Requirements and Commentary, Structural Engineers Association of California, sixth edition, 1996, Sections 104.7 and 201.

Risk Management Planning, 40 CFR Part 68 (EPA)

SARA Title III

SFPE Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings (NFPA and SFPE, 2007)

Society Of Fire Protection Engineers Position Statement #03-02, Guidelines For Peer Review In The Fire Protection Design Process (SFPE, 2009)

Structural Engineers of California Blue Book (SEAOC, 1996)

Superfund Amendments and Reauthorization Act (SARA), Title III (EPA, 1986)

Vision 2000 Report (Structural Engineers of California, 1995)